

AD-R135 484

WAVE PROPAGATION STUDY OF THE CENTRAL MEDITERRANEAN SEA 1/2

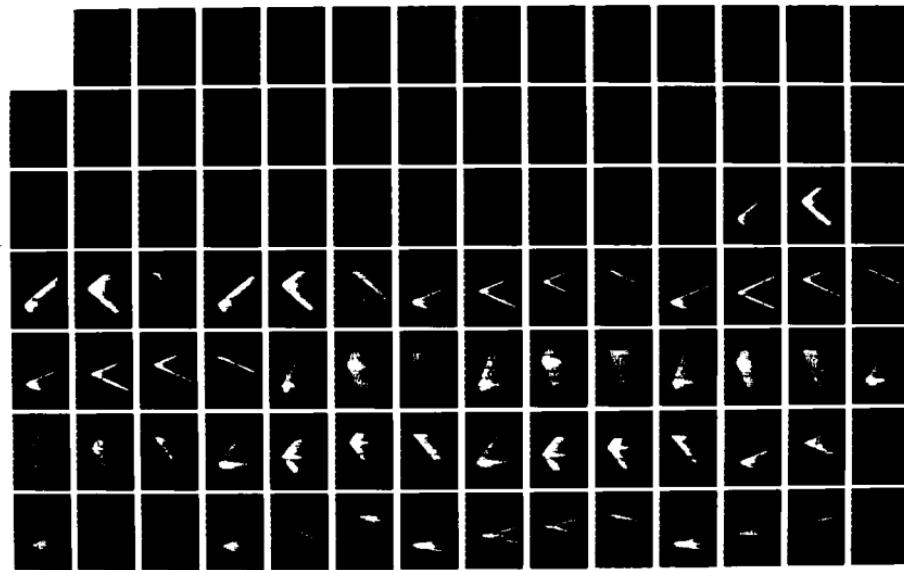
USING OCEAN BOTTO. (U) TEXAS UNIV AT AUSTIN INST FOR
GEOPHYSICS W P O'BRIEN ET AL. 01 NOV 83 CONTRIB-575

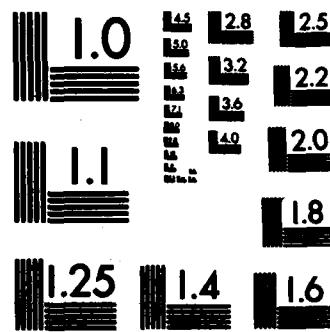
UNCLASSIFIED

N00014-77-C-0606

F/G 8/11

NL





MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

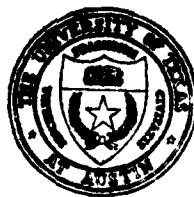
(6)

AD-A135-484

WAVE PROPAGATION STUDY
OF THE CENTRAL MEDITERRANEAN SEA
USING OCEAN BOTTOM SEISMOMETERS

William P. O'Brien, Jr.
and
Subir Chatterjee

OFF FILE COPY



THE UNIVERSITY OF TEXAS AT AUSTIN
Institute For Geophysics

This document has been approved
for public release and sale; its
distribution is unlimited.

S DTIC ELECTED DEC 08 1983 D
E

83 11 17 003

6

WAVE PROPAGATION STUDY
OF THE CENTRAL MEDITERRANEAN SEA
USING OCEAN BOTTOM SEISMOMETERS

William P. O'Brien, Jr.
and
Subir Chatterjee

Institute for Geophysics
The University of Texas at Austin
4920 North IH 35
Austin, Texas 78751

(512) 451-6223

1 November 1983

Office of Naval Research Contract Number: N00014-77-C-0606
Modification Number: P00007

Principal Investigators: Dr. Paul L. Donoho
Dr. Douglas W. McCowan

Co-Investigator: Dr. William P. O'Brien, Jr.



University of Texas Institute for Geophysics Contribution No. 575.

This document has been approved
for public release and sale; its
distribution is unlimited.

TABLE OF CONTENTS

Introduction	1
Description of the Experiments	1
Ocean Bottom Seismometers	1
Sound Sources	5
Field Operations	5
Data	9
Analysis of Water Wave and Body Wave Data	11
Variation of Energy Levels with Distance	12
Signal/Noise Ratios	12
Frequency Spectra	17
Geological Interpretation	21
Conclusions	25
Recommendations	28
Acknowledgments	29
References	29
Appendices	
A OBS and Shot Coordinates and Distances	A-1
B Complete Set of Seismic Record Sections	B-1

Accession For	
NTIS GRA&I <input checked="" type="checkbox"/> DTIC TAB <input type="checkbox"/> Unannounced <input type="checkbox"/> Justification <i>[Signature]</i>	
By _____	
Distribution/ _____	
Availability Codes	
Dist	Avail and/or Special
A-1	

ABSTRACT

4 Ocean bottom seismometers (OBS) were deployed in the Mediterranean for two refraction surveys shot with underwater sound signal (SUS) charges. The digital data were analyzed to determine: (1) the attenuation features, signal/noise (S/N) characteristics and frequency content of water waves and body waves; and (2) the crustal structure of the test areas. The attenuation of water-wave signals was fairly uniform within the passband of the OBS (10-31 HZ) and was greater in deep water than in shallower water, and body waves were much more strongly attenuated than water waves. The S/N ratios were much larger for the SUS shots detonated at 91 m depth than for those detonated at 244 m depth. The body-wave data indicated the presence of a layer with P-wave velocity of 3.8 km/sec about 0.8 km below mean sea level in one test area. Probably this is a Miocene evaporite sequence. ↗

INTRODUCTION

Two seismic refraction lines were shot with explosives in the central Mediterranean in the fall of 1981 using Ocean Bottom Seismometers (OBS) to study acoustic and seismic wave propagation in the test areas. These were the final field operations in a long-term collaborative project between the University of Texas Institute for Geophysics (UTIG - formerly the Marine Science Institute) and the Office of Naval Research for the design, development and testing of a light-weight, self-contained, easily deployed and recovered electronic system for detecting and recording seismic data on the ocean floor. The two lines, denoted Line 21 and Line 22 (Figs. 1 and 2), were located in the Mediterranean Sea between Sicily and northern Africa. They comprised part of a Mediterranean acoustic survey conducted from the USNS Wilkes (Survey 3306-81).

The OBS experiments were included in the program to address several objectives: 1) to gather water-borne and earth-borne acoustic data for analysis and comparison with sonobouy data recorded simultaneously on shipboard, 2) to record refracted arrivals to find layer velocities and depths for modeling the geological structure of the region, and 3) to field test the OBS, a new technological tool, for future applications in studying signal propagation.

The analysis of the data recorded by the OBS units is the sole subject of this report since we had no access to the sonobouy data.

DESCRIPTION OF THE EXPERIMENTS

Ocean Bottom Seismometers

The OBS used in these experiments (Latham et al., 1978; Steinmetz et al., 1979) consisted of a 10 Hz triaxial geophone system with recording and control electronics housed in a glass sphere 43 cm in diameter that was secured firmly in a heavy square spiked metal frame about 1.2 m on each side (Fig. 3). The sampling rate of the instrument was approximately 136 samples/sec (sample interval = 7.344 ms), and the dynamic range was about 96 dB.

At deployment, an OBS in its frame was released from the sea surface and allowed to fall to the sea bottom, where upon impact the spiked frame firmly lodged in the sea floor providing good coupling between ground motion and the OBS geophones. Each unit contained electronic clocks and three microprocessors programmed to activate the instrument at the beginning of the line and to detect and record 60-second segments of multiplexed 3-component digital data for each shot. All OBS units possessed an externally-mounted compass, whose needle locked into place several hours after the OBS reached bottom, allowing us to determine the orientation of the two horizontal geophones. Each OBS was programmed so that at the appropriate time an electric current caused the electrochemical dissolution of the stainless steel wire holding the instrument sphere in the heavy frame, allowing the sphere to float to the surface for recovery.

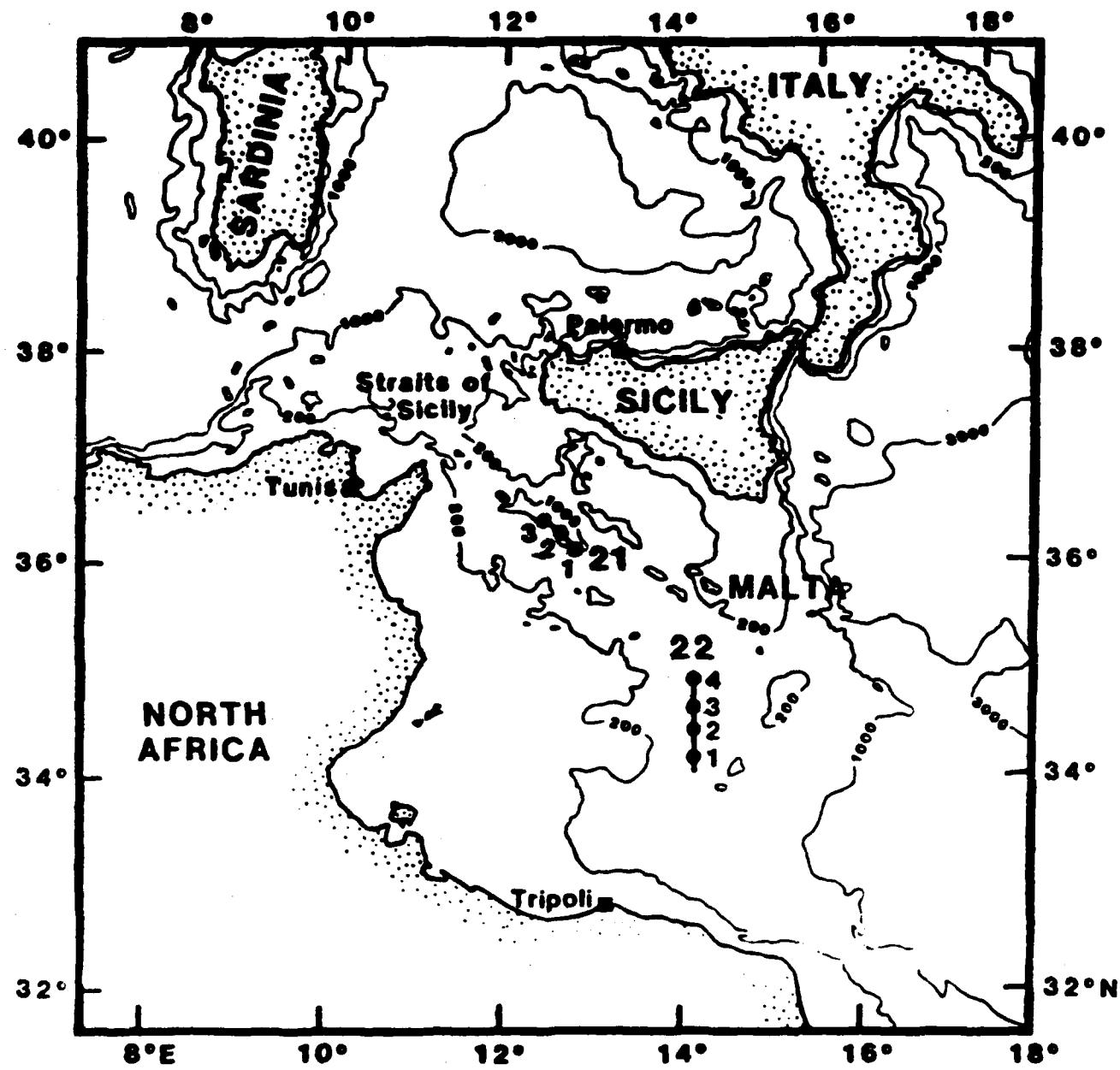


Fig. 1. Location of Line 21 and Line 22; circles denote the OBS locations; depths in meters.

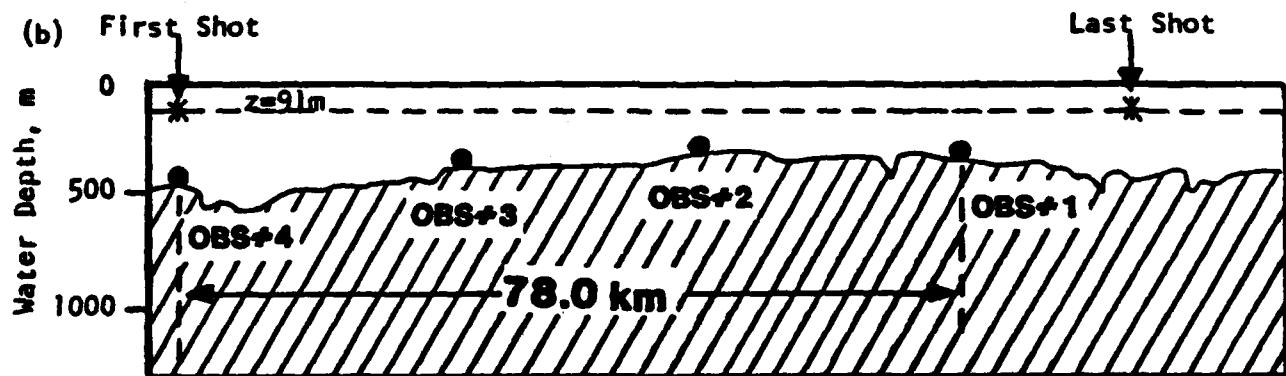
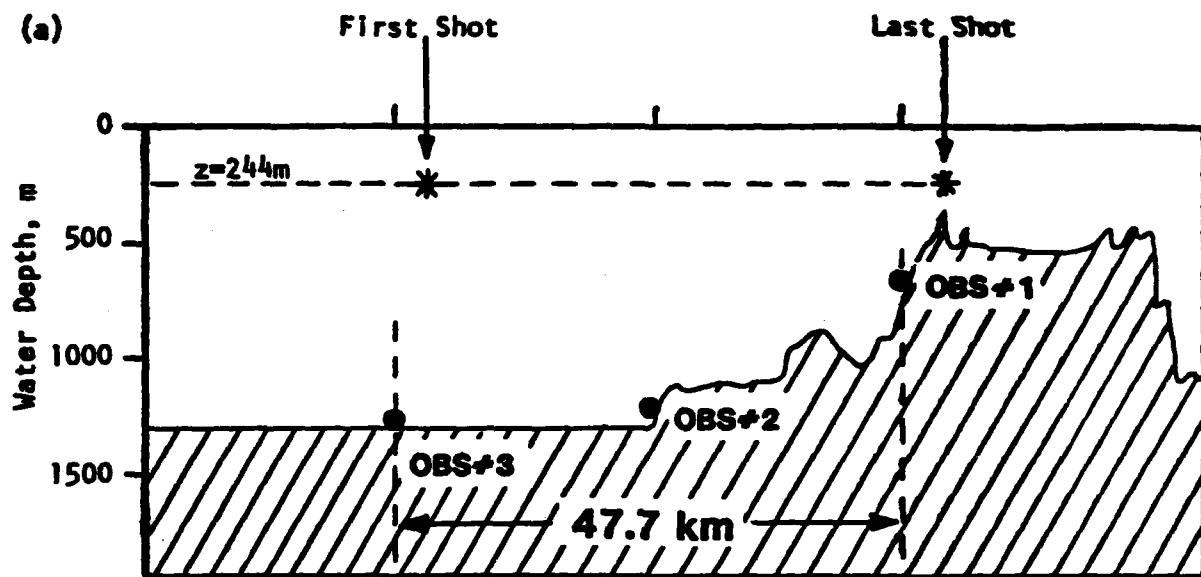


Fig. 2. Bathymetry with OBS locations, end-point shot locations and depths for a) Line 21 and b) Line 22.

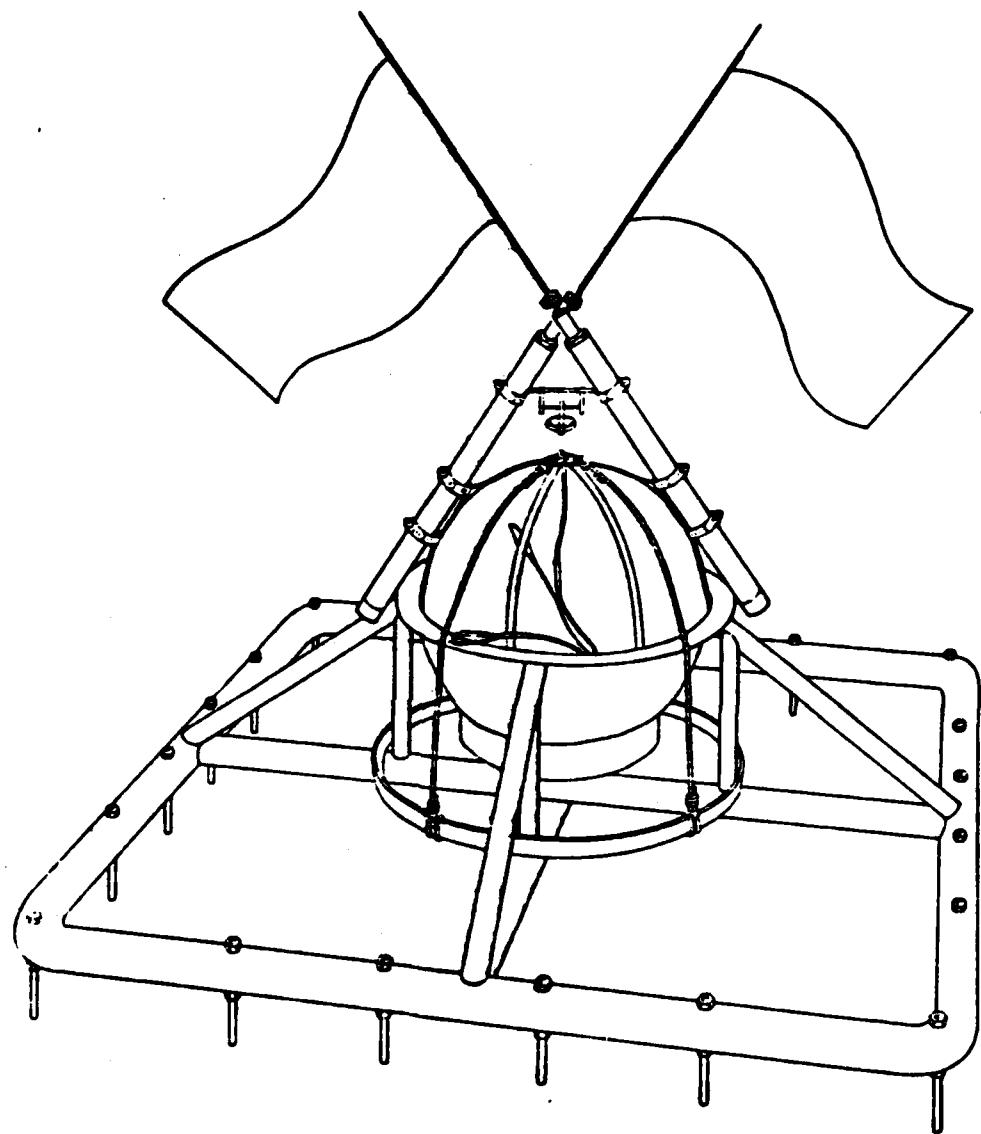


Fig. 3. The UTIG digital OBS used in these experiments,
mounted in its spiked frame.

The instrumental response of the OBS depends on at least four separate factors: the geophone response, the electronic alias filter in the pre-amplifier, the structure of the OBS frame and the degree of coupling of the frame to the ocean bottom. The output EMF of the geophones used in these experiments was directly proportional to the velocity of ground motion for frequencies above the geophone frequency of 10 Hz. The EMF generated at frequencies below 10 Hz fell off exponentially with a rolloff of -12 dB/octave. The low-pass alias filter had a corner frequency of about 31 Hz and a rolloff of -24 dB/octave at frequencies above 31 Hz. No resonance tests were made on the frames used in these experiments although a prototype frame was tested extensively (Steinmetz et al., 1979) and found to have its fundamental resonance at 24 Hz. Presumably the frame we used had its resonance frequency above 24 Hz because it was built more rigidly than the prototype frame. The coupling of an OBS frame to the ocean floor is a classic unresolved problem (Sutton et al., 1981).

The unknown coupling factor and the fact that the geophones and electronics were not bench calibrated made it impossible to determine an absolute instrumental response for the OBS. We did, however, determine the relative instrumental response of the OBS by considering only effect of the geophone and electronic filter (Fig. 4). Note that the passband ranges from 10 to 31 Hz, a broad band which contains most of the signals of interest in this experiment.

Sound Sources

The sound sources used (Fig. 5) were standard underwater sound signal (SUS) charges (Gaspin and Shuler, 1971). The original plan also called for a towed acoustic projector source on each OBS line, but the projector malfunctioned and was not used on either line. For Line 21 we used Mark 61 SUS charges detonated by pressure at a depth of 244 m (800 ft), and for Line 22 we used Mark 82 SUS charges detonated by pressure at a depth of 91 m (300 ft). Each of these SUS charges contained 0.82 kg (1.8 lb) of TNT. For Line 21, using shots detonated at 244 m depth, the peak of the source energy spectrum was near 60 Hz; for Line 22, using shots detonated at 91 m depth, the peak was near 28 Hz.

Field Operations

The general procedure for an OBS seismic refraction survey is to deploy several OBS units from shipboard along a straight line, then to steam the line while dropping explosive charges, and finally to recover the surfaced instruments. This procedure was followed for the OBS surveys described in this report.

The USNS Wilkes departed Palermo, Sicily, on the afternoon of 3 November 1981, and arrived at Station 21 for the first OBS line (Line 21) on 6 November 1981. Three OBS units were deployed along the 48 km line (Fig. 6; Appendix A). Then a sonobouy was deployed, and as the ship steamed the line at about 10 knots, SUS charges (detonation depth = 244 m) were dropped at 3-minute intervals (Appendix A). All three OBS units were then recovered. The shot spacing along this line was about 0.9 km, and the water depths along this line ranged from about 1300 m to about 400 m (Fig. 2a).

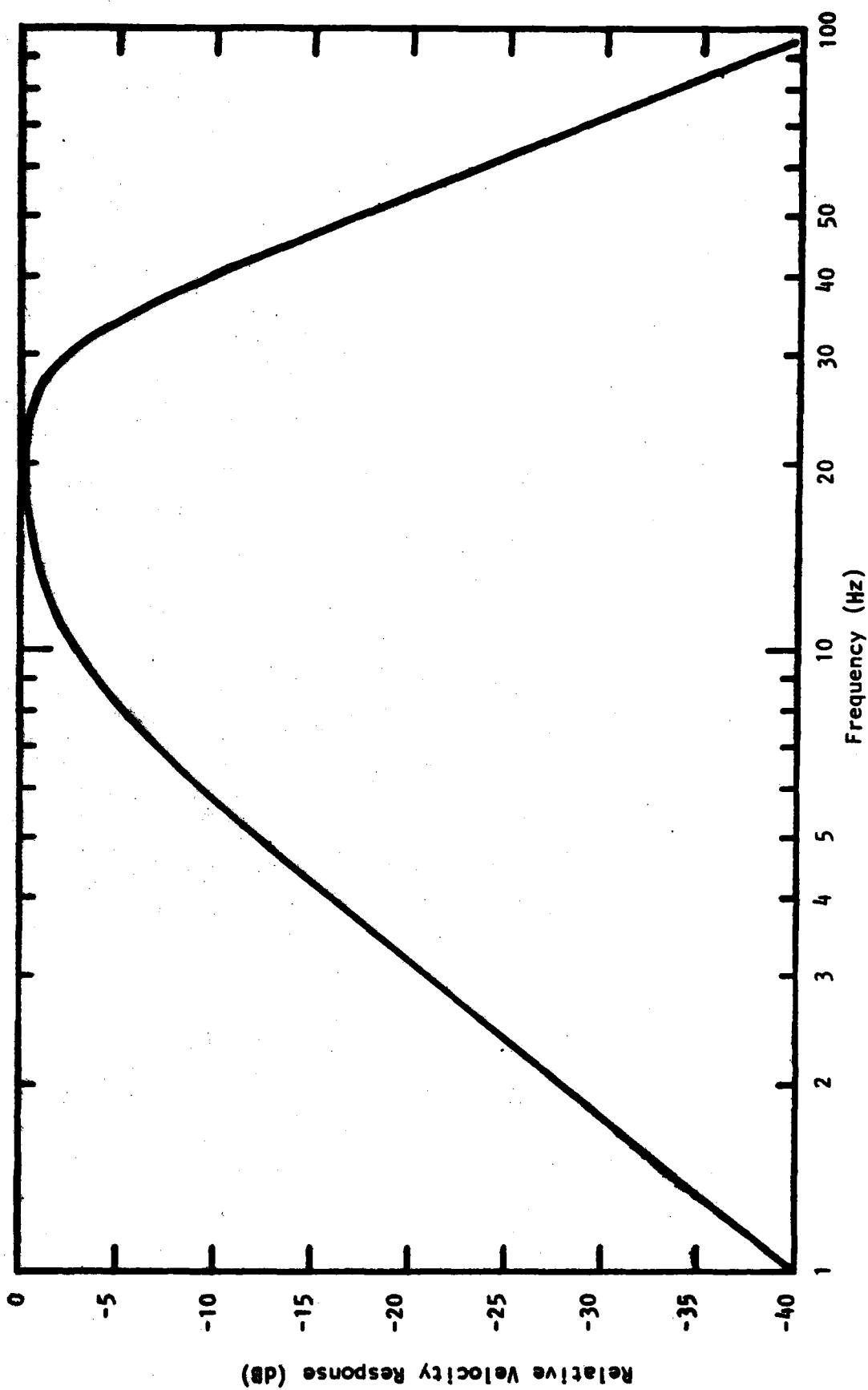


Fig. 4. Relative instrumental response to ground velocity of the UTIG OBS. This curve takes into account the properties of the geophones and the alias filter.

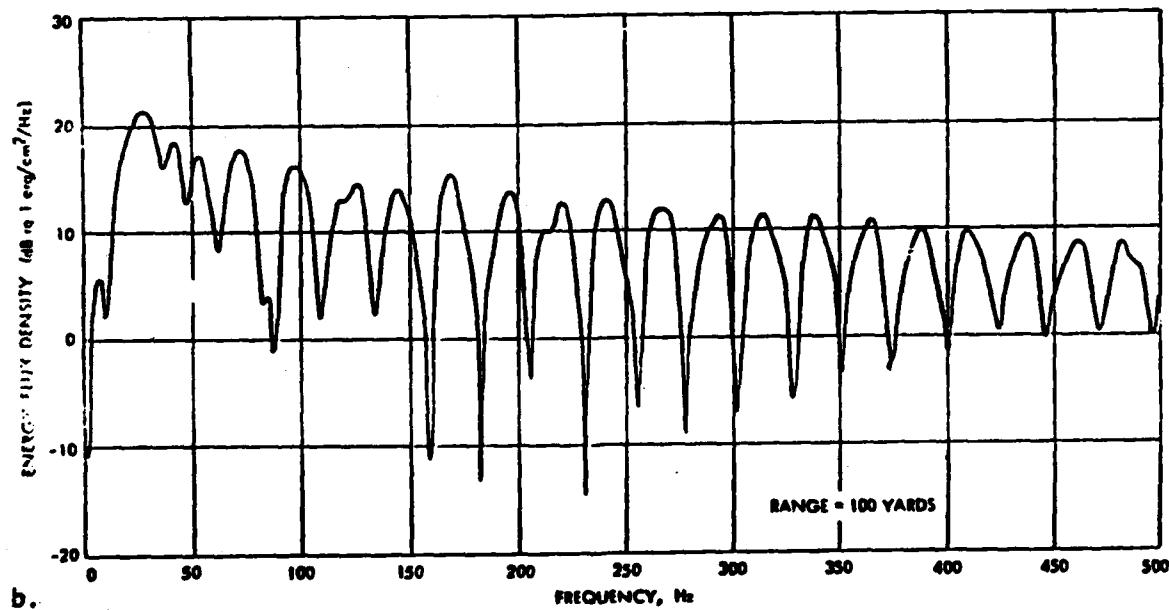
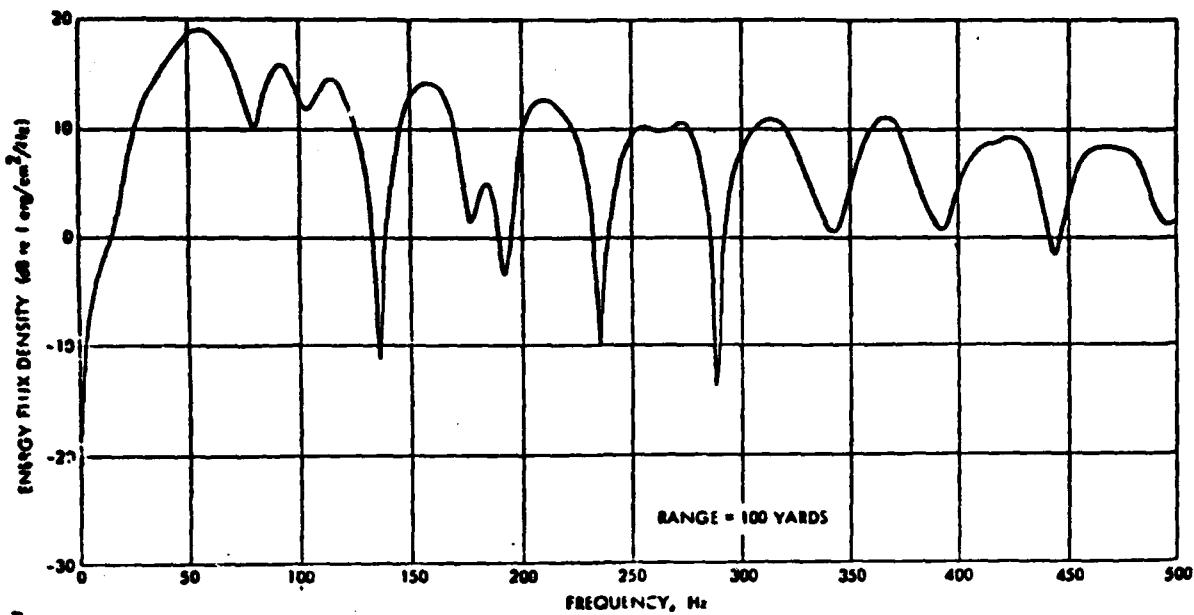


Fig. 5. Source frequency spectra for a) Mark 61 SUS charges detonated at 244 m (800 ft) on Line 21, and b) Mark 82 SUS charges detonated at 91 m (300 ft) on Line 22. All charges contained 0.82 kg (1.8 lb) of TNT (from Gaspin and Schuler, 1971).

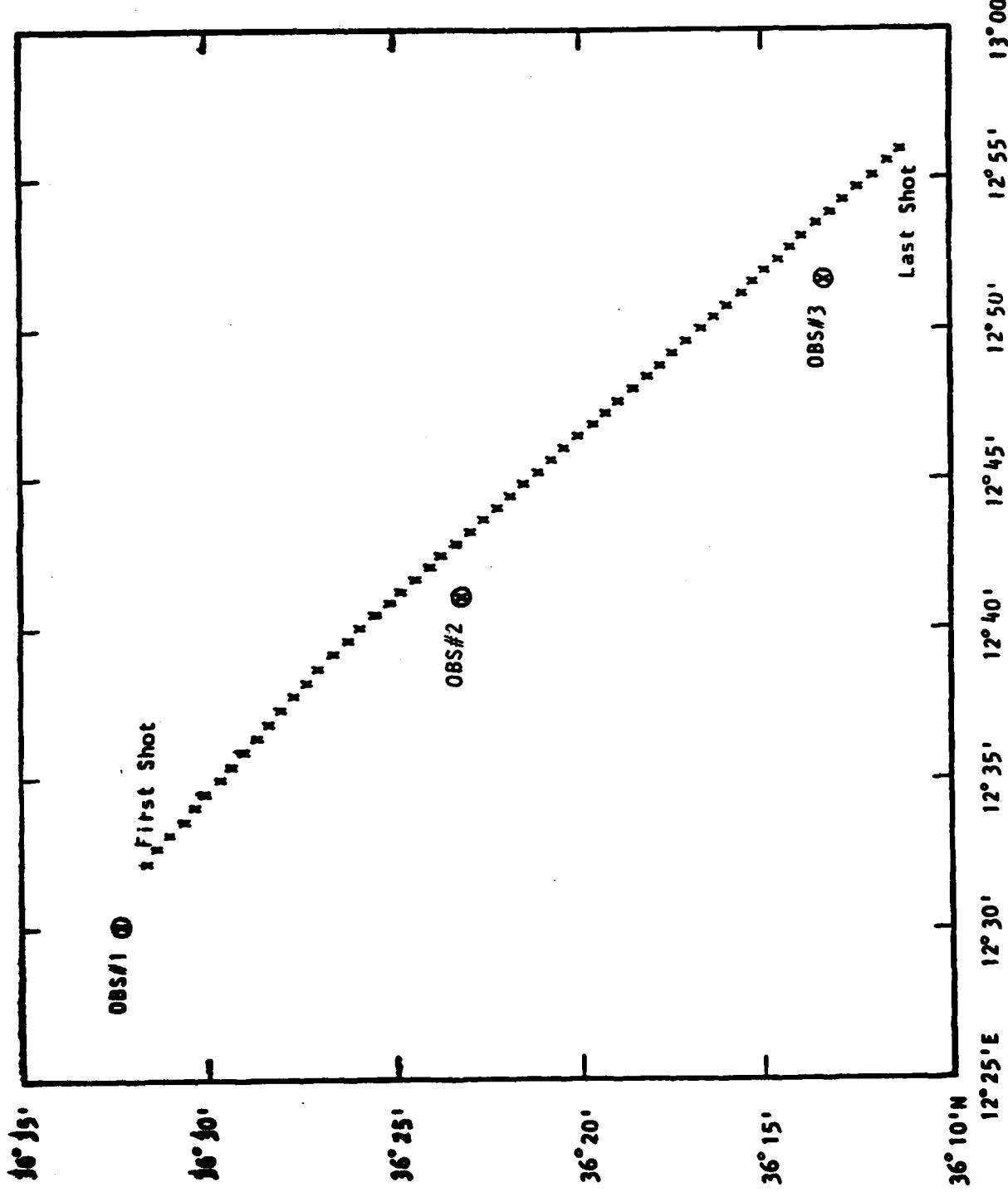


Fig. 6 OBS and shot location details for Line 21.

The ship arrived at Station 22 to begin Line 22 on the morning of 9 November 1981. Four OBS units were deployed along the 78 km line (Fig. 7; Appendix A). Then a sonobouy was deployed, and as the ship steamed the line at about 10 knots, SUS charges (detonation depth = 91 m) were again dropped at 3-minute intervals. The sonobuoys again transmitted data to the ship from each shot, but the OBS units on the line were programmed to record only every other shot in order to use most effectively the limited data recording capability of the OBS units on this longer line. All four OBS units were then recovered. The shot spacing along this line was about 1.7 km, and the water depths along this shallower line ranged from about 280 m to about 580 m (Fig. 2b).

The OBS and shot coordinates listed in Appendix A are based on the best navigational information available to us. These data came from the onboard SATNAV system which gave the latitude and longitude of points to the nearest 0.1 minute of arc, which translates to a relative location uncertainty of about 200 m (0.1 nautical mile). Roger Merrifield (personal communication) estimated the uncertainty in the SATNAV system as a whole to be about 500 m (0.25 nautical mile) for absolute locations. The shot-to-OBS distances and other quantities derived from the navigation data are subject to these uncertainty considerations.

The Chief Scientist for the cruise was Roger Merrifield of NAVOCEANO of Bay St. Louis, Mississippi. Personnel from NORDA/NAVOCEANO and from the Institute for Acoustic Research of Miami, Florida, conducted the sonobouy and sound source operations of the experiments.

The UTIG team aboard the USNS Wilkes in charge of conducting these OBS experiments consisted of William P. O'Brien, Jr. and Paul M. McPherson. Paul L. Donoho, the designer of the OBS, was not aboard the Wilkes but was present in Sicily for several days prior to departure to direct the final checkout of the hardware and software.

DATA

Each of the 58 recording windows programmed into the three OBS units on Line 21 was 60 seconds long as were the 55 windows programmed into the four OBS units on Line 22. No charges were detonated for shots 1, 11 and 52 of Line 21 or for shots 1, 2, 14 and 35 of Line 22 (see Appendix A). The shot times were determined by comparing the recorded signals from a towed hydrophone with a recorded time from a calibrated electronic master clock, taking into account the elapsed time between the actual shot and the detection of the shot by the towed hydrophone. This elapsed time was calculated using the mean value of the sound velocities determined by XBT casts over the depth range of interest; the sound velocities used were 1.52 and 1.53 km/sec for Lines 21 and 22, respectively. The master clock also was used to determine the drift of each OBS clock during deployment. The digital data recorded on each 4-track OBS cassette tape were transferred to 9-track tape in standard SEG-Y format (Barry et al., 1980). This format incorporated the firing time, clock drift and travel time corrections so that the first sample on each trace (at t = 0 sec) corresponded to the actual shot time. Further processing utilized the VAX 11/780 computer at UTIG.

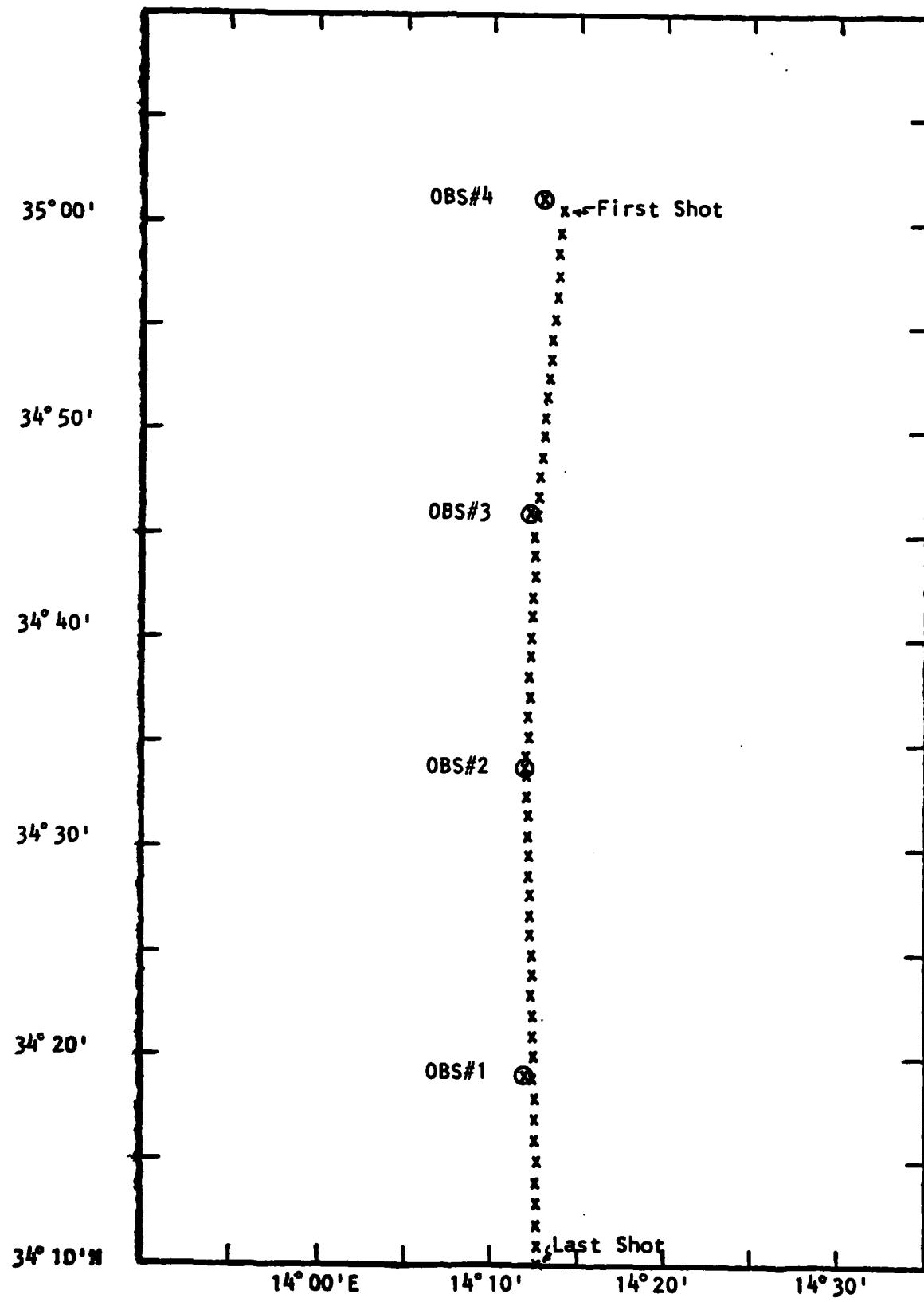


Fig. 7. OBS and shot location details for Line 22.

For Line 22 the horizontal data were transformed using a rotation matrix that took into account the orientation of the OBS and the azimuth of the shot relative to the OBS. This transformation yielded the radial (R) component of motion (along the line connecting the shot to the OBS) and the transverse (T) component (perpendicular to the line connecting the shot to the OBS).

A DC bias was found to be superimposed on the data from several OBS units, so all the data were filtered with a broad bandpass filter (passband from 1 to 65 Hz) before further analyses. The instrument used as OBS#3 on Line 21 was the same instrument used as OBS#4 on Line 22; the quality of data recorded by this unit was poor because an electronic malfunction added about 25 dB of instrumental noise to the data.

Seismic record sections of 1) all the raw OBS data, and 2) rotated data plotted with using reducing velocities of 1.7 and 4.5 km/sec are given in Appendix B. The high-frequency large-amplitude water wave arrival was the most pronounced feature on each trace.

DATA ANALYSIS

The acoustic energy released into the water by each shot travels to each OBS along many different paths. For our purposes the waves are designated either as water waves, which travel directly or indirectly through the water column, or as body waves, which refract into the sea bottom and propagate through the bottom and sub-bottom materials to the OBS.

We first determined relative energy levels for the water waves and body waves by integrating the power over the first 1.0-second interval of the wavetrain under consideration. We then studied the variation of these energy levels with distance. Energy levels for noise signals taken prior to the arrivals were calculated similarly, and these were used to calculate the overall signal/noise (S/N) ratios for arrivals recorded by the OBS units. We next calculated the spectral composition of the various types of signals and determined the frequency dependence of the attenuation factor k and the S/N ratio. Finally we analyzed the body-wave arrivals and deduced a model for the ocean crust in the test area.

The data were not corrected for the instrumental response of the various OBS units; therefore the results mainly apply to signals in the passband of 10 to 31 Hz. Furthermore, since the OBS units were not calibrated before deployment, there was no meaningful comparison of signal levels that could be made from one OBS to another. However, it was possible to compare, from one shot to another, the signal level of a particular phase of an arrival recorded by a single OBS.

Variation of Energy Levels with Distance

For a wave incident on the ocean bottom the fraction of energy that is transmitted into the earth depends on the wavelength, the surface geometry and the composition and thickness of the sediment layers. These factors determine the "bottom loss" (Vidmar, 1980) by governing the degree of compressional wave and shear wave excitation and absorption. The variation of the energy levels E of a wave with distance r is most clearly revealed by plotting $\log E$ vs. $\log r$. If we let k denote the slope of a least-squares straight line fit to this plot, then we can easily model the total attenuation of the energy by

$$E = a r^k$$

Figures 8 and 9 present the results of this type of analysis for the water waves detected by the vertical-component geophones in the two good OBS units on Line 21 and by the four OBS units on Line 22. For the data from Line 22 (shallow water) the slopes ranged from -1.40 to -2.18. This suggests wavefront propagation in a geometric regime intermediate between cylindrical and spherical divergence. This result for the shallow water propagation is probably due to the effects of surfaces and waveguide phenomena. For the data from Line 21 (deep water) the slopes were -2.29 and -2.36. These suggest that the observed energy attenuation was due to a combination of spherical-wavefront spreading, for which energy varies inversely with the square of distance, and a term that decreased exponentially with distance. Therefore, we modeled the energy E for this line as

$$E = a r^{-2} e^{-br}$$

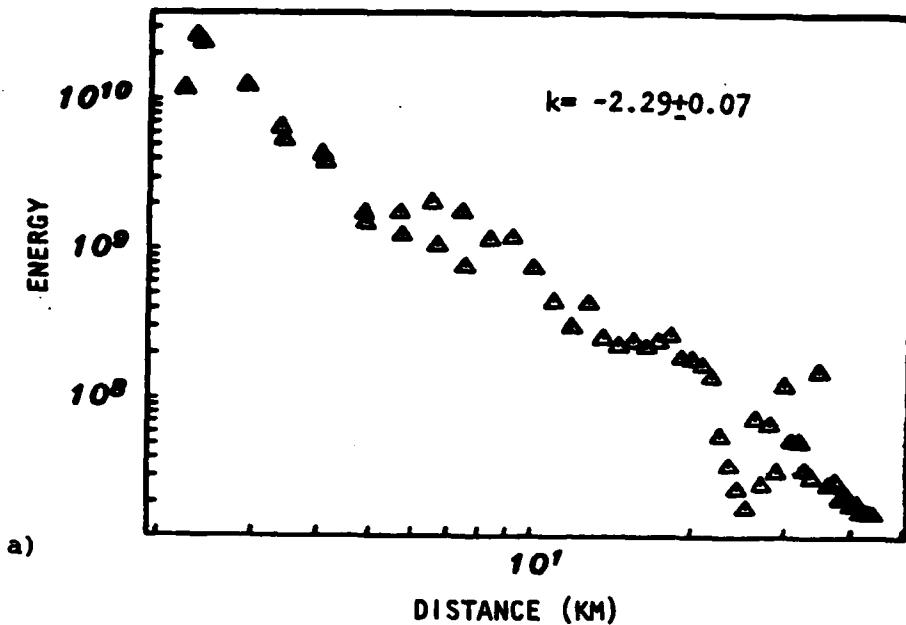
The resulting values for the attenuation coefficient b were $-0.0069 \pm 0.0024 (\text{km})^{-1}$ for OBS#1 and $-0.0143 \pm 0.0031 (\text{km})^{-1}$ for OBS#2.

Body waves were clearly discernible only in the horizontal radial geophone data from three OBS units on Line 22. The refracted body waves chosen for calculating the body-wave energy levels (Fig. 10) were those that were the most pronounced in the data, and all had an apparent group velocity of about 3.8 km/sec. For these data the slope k ranged from -2.51 to -4.80, indicating a much higher degree of attenuation for the refracted signals than for the water waves. In the limit of two isotropic layers separated by a plane boundary, the refracted energy (headwaves) would be expected to decrease inversely with the fourth power of the distance.

Signal/Noise Ratios

To determine the S/N ratio for a water wave or body wave detected by an OBS at a given distance, we first averaged the 1.0-second noise energy levels of all traces analyzed from that particular OBS to determine the mean 1.0-second noise energy level characteristic of that unit. We then calculated the interpolated value of the signal energy level at the desired distance from the data in Figs. 8-10 and divided this interpolated signal value by the mean noise value to get the desired S/N ratio. These S/N ratios (in dB) are given in Table 1 for distance values of 2 km, 10 km and 20 km along with the estimated distance values for which the signal and noise levels would be equal ($S/N = 0 \text{ dB}$).

LINE 21 OBS 1V WATER WAVE



LINE 21 OBS 2V WATER WAVE

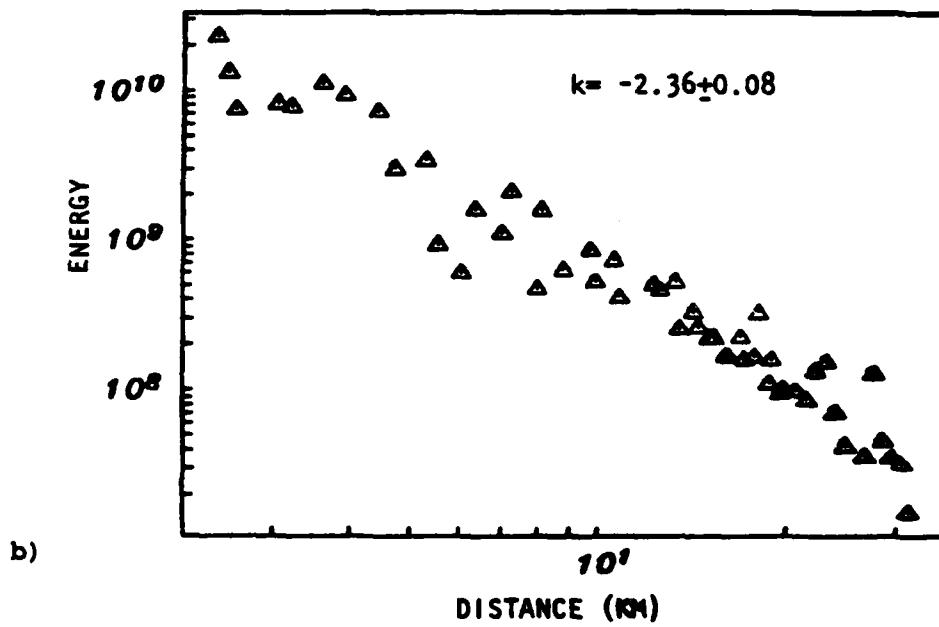
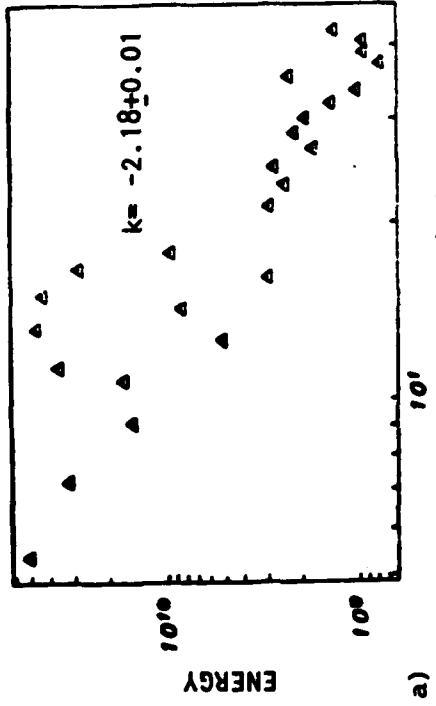
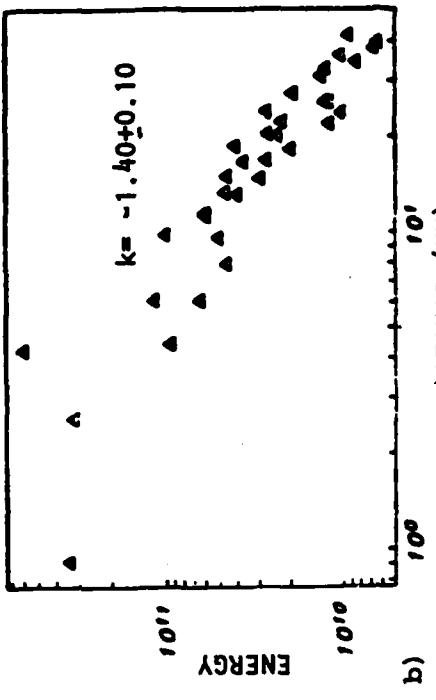


Fig. 8. Log E vs. log r for the water-wave data from a) OBS#1 and b) OBS#2 of Line 21. The slope of the least-squares straight line through these points is the corresponding value for the attenuation coefficient k. Energy values are in an arbitrary unit. The error term for the k values represents one standard deviation.

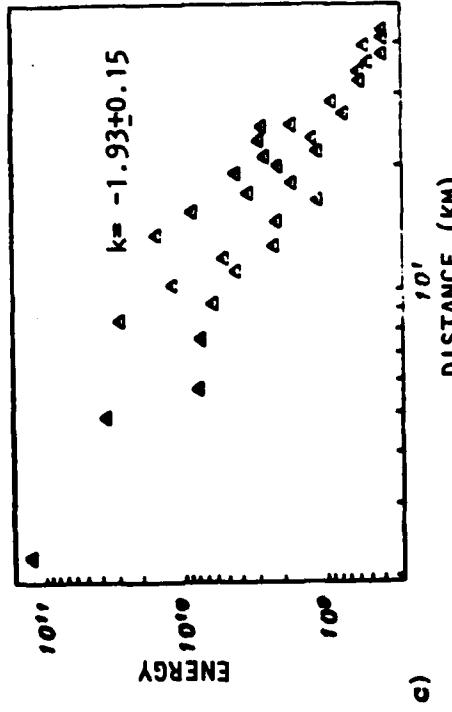
LINE 22 OBS 4V WATER WAVE



LINE 22 OBS 2V WATER WAVE



LINE 22 OBS 3V WATER WAVE



LINE 22 OBS 4V WATER WAVE

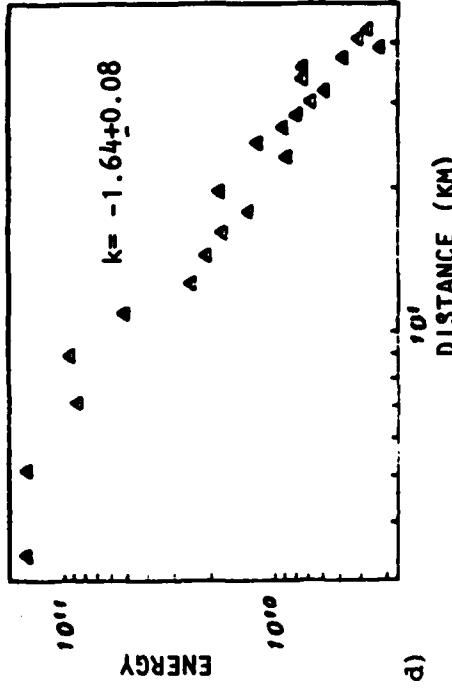


Fig. 9. Log E vs. $\log r$ for the water-wave data from a) OBS#1, b) OBS#2, c) OBS#3 and d) OBS #4 of Line 22. The slope of the least-squares straight line through these points is the corresponding value for the attenuation coefficient k .

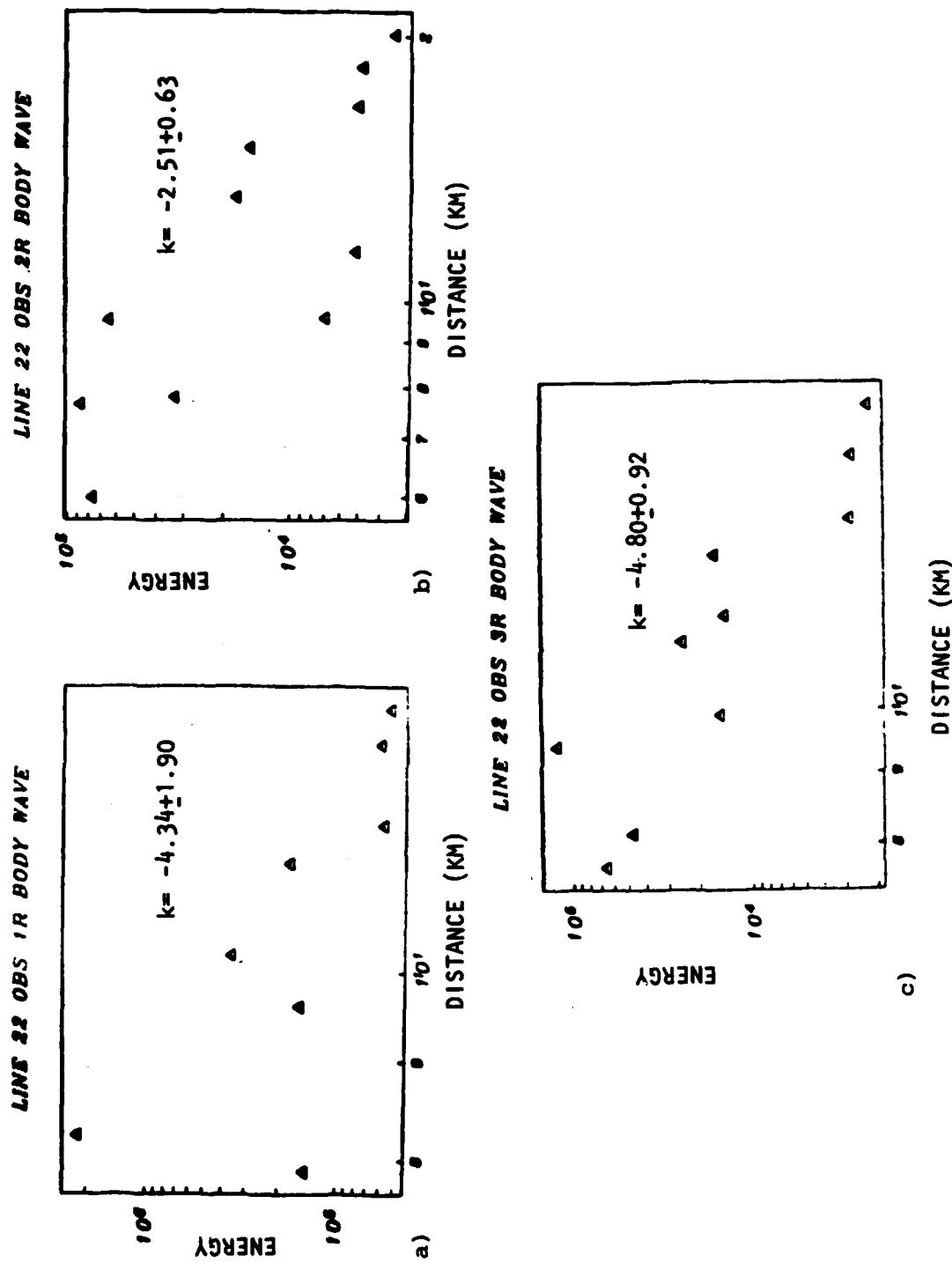


Fig. 10. Log E vs. $\log r$ for the body-wave data from a) OBS#1, b) OBS#2 and c) OBS#3 of Line 22. The slope of the least-squares straight line through these points is the corresponding value for the attenuation coefficient k .

Table 1. Estimated S/N ratios (dB) at shot-to OBS distances of 2 km, 5 km, 10 km and 20 km for water waves and body waves for the OBS units on Line 21 and Line 22. The estimated distances for which the signal levels equal the noise level are given in the last column.

LINE	OBS	S/N RATIOS(dB)			<u>R(km)</u>	
		<u>r=2 km</u>	<u>r=5 km</u>	<u>r=10 km</u>	<u>r=20 km</u>	<u>For S/N=1</u>
WATER WAVES						
21	1V	45.3	36.2	29.3	22.4	190
	2V	47.1	37.7	30.6	23.5	197
22	1V	58.9	50.2	43.7	37.1	1010
	2V	57.4	51.8	47.6	43.4	25200
3V	53.8	46.1	40.3	34.4	1210	
	4V	33.1	26.5	21.6	16.6	205
BODY WAVES						
22	1R	61.6	44.3	31.2	18.2	52
	2R	38.5	28.5	21.0	13.4	69
	3R	56.2	37.1	22.7	8.2	30

On Line 22 the OBS units detected water-wave signals out to the maximum shot-to-OBS distance of about 75 km. The average S/N ratio measured at this range was 27.8 dB for the three good units on Line 22; for the two OBS units of Line 21 (which was actually only 48 km long), the extrapolated value at 75 km was 9.6 dB. The low S/N ratio value for OBS#4 of Line 22 was not included in the average for this line since the instrumental noise was abnormally high for that unit. The cause for the large difference between the S/N ratios for the two lines is that much more source energy was within the 10 to 31 Hz passband of the OBS for Line 22 than for Line 21. In addition the rate of the amplitude decrease with distance was less in the shallow water. Note from Fig. 5 that the energy peak is at 60 Hz for Line 21 (shot depth = 244 m) whereas it is at 28 Hz for Line 22 (shot depth = 91 m).

On Line 22, OBS#1, OBS#2 and OBS#3 detected body-wave signals out to distances of 14 km, 20 km and 17 km, respectively. The average S/N ratio for the three units at a distance of 15 km was 18.1 dB.

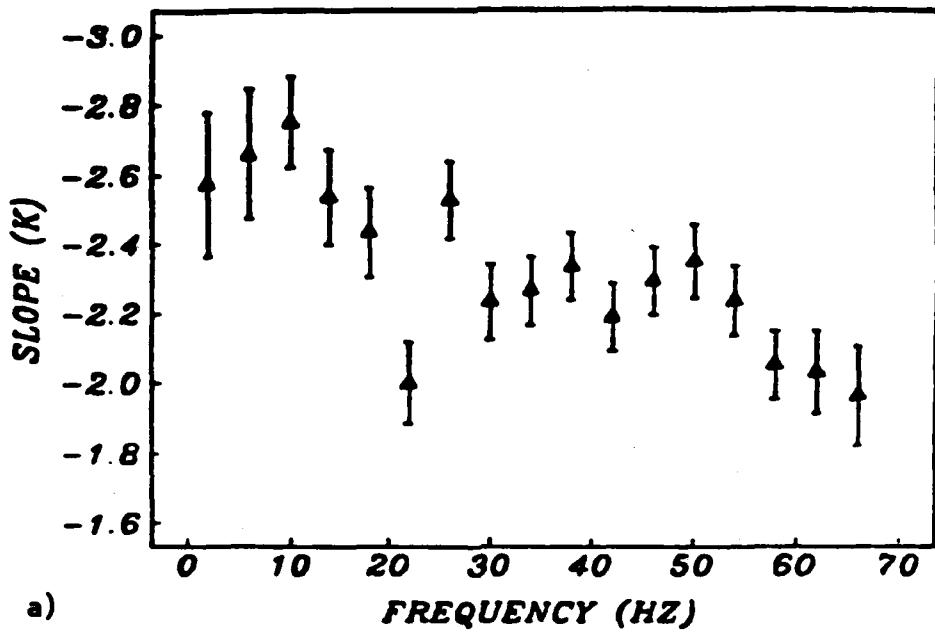
The distances listed in the last column in Table 1 are the extrapolated range values where the water-wave signal becomes as weak as the noise; the average values for these distances are about 200 km for Line 21 (deep SUS shots) and about 1100 km for OBS#1 and OBS#3 of Line 22 (shallow SUS shots). The large range predicted for OBS#2 of Line 22 is suspect since the attenuation factor k for that unit was markedly less than those of the other two good OBS units on the line, presumably because of instrumental noise. The corresponding distance for the body waves from Line 22 is about 50 km.

Frequency Spectra

All previous calculations concerning the signal and noise energy levels for various portions of the data traces have made use of the total energy at all frequencies. However, the various types of signals and noise had different spectral characteristics.

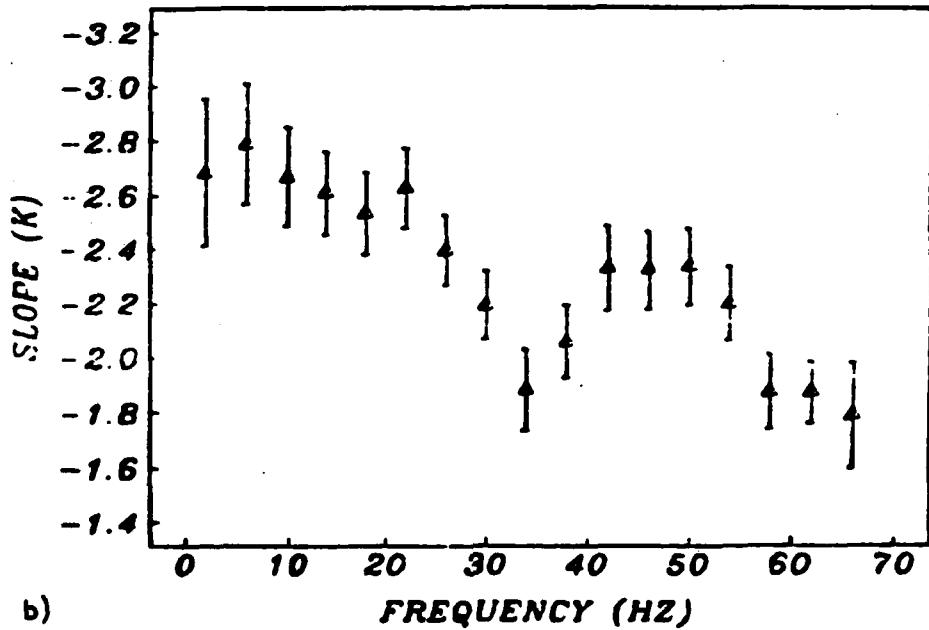
To evaluate the frequency dependence of the energy attenuation factor k , we analyzed the power spectra of the first 1.0-second of the water-wave and body-wave arrivals from both Line 21 and Line 22. We partitioned the frequencies from 0 to 68 Hz (the Nyquist frequency) into 17 4-Hz bands and determined the total integrated energy for each of these 4-Hz bands for each OBS. For each frequency band of each data record considered, $\log E$ was plotted vs. $\log r$ and the data fitted by least squares to find the slope k (attenuation factor). The values of k were plotted as functions of the frequency for the water-wave and body-wave data (Figs. 11-13). The apparent decrease in the absolute value of k for frequencies greater than about 30 Hz is probably an artifact of the instrumental response: the signal level was reduced by the alias filter while the instrumental noise continued to contaminate the data. The data in the passband of 10 to 31 Hz showed no consistent relationship between the attenuation coefficients k and the frequency.

LINE 21 OBS 1V WATER WAVE



a)

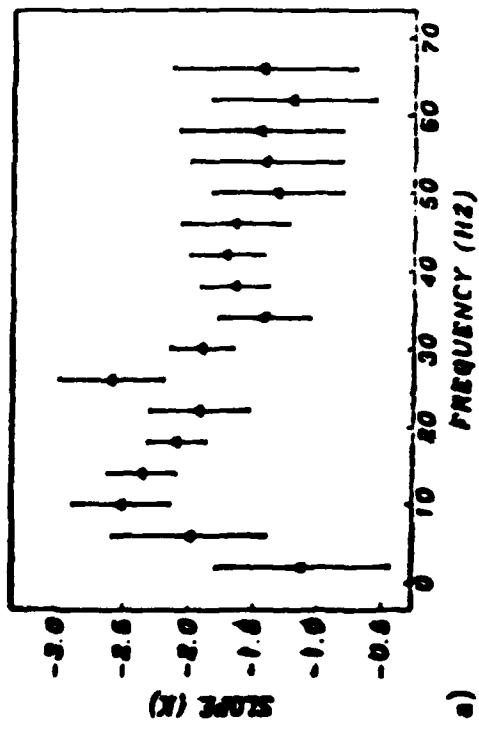
LINE 21 OBS 2V WATER WAVE



b)

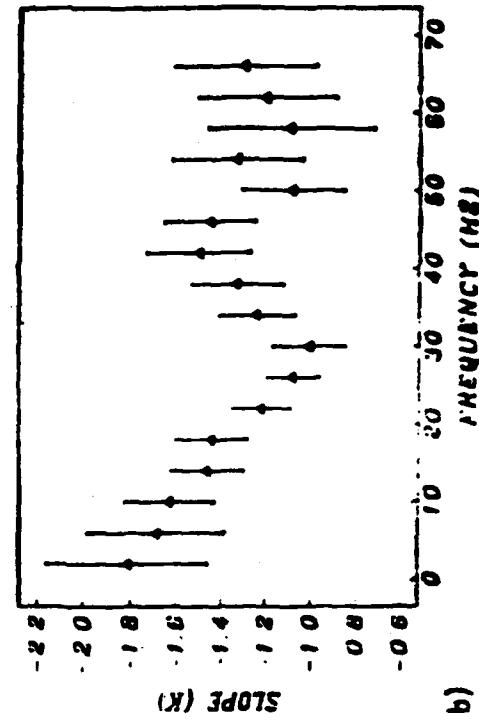
Fig. 11. Frequency dependence of the water-wave attenuation factor k for a) OBS#1 and b) OBS#2 of Line 21. Vertical bars indicate ranges of one standard deviation.

LINE 22 OBS 3V WATER WAVE



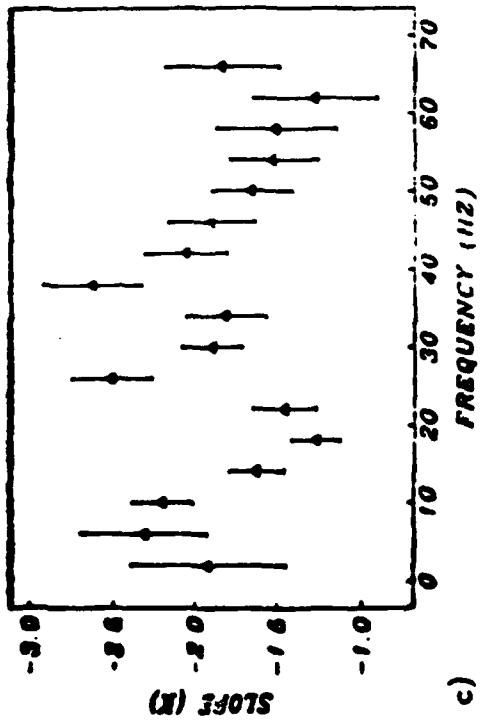
a) SLOPES

LINE 22 OBS 2V WATER WAVE



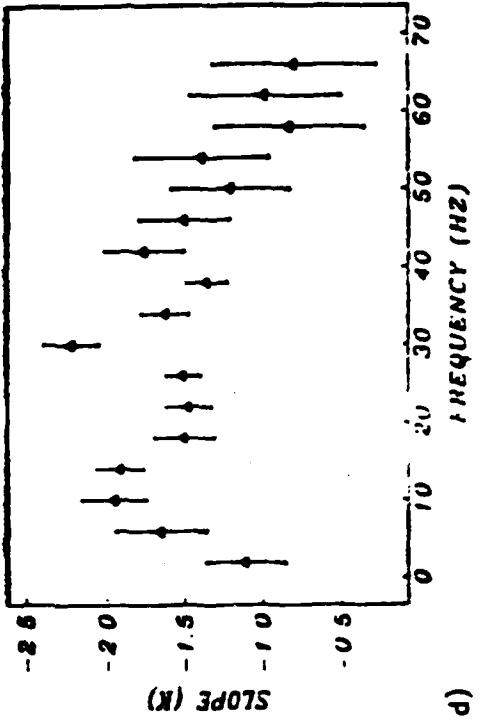
b)

LINE 22 OBS 3V WATER WAVE



c)

LINE 22 OBS 2V WATER WAVE



d)

Fig. 12. Frequency dependence of the water-wave attenuation factor k for a) OBS#1, b) OBS#2, c) OBS#3 and d) OBS#4 of Line 22. Vertical bars indicate ranges of one standard deviation.

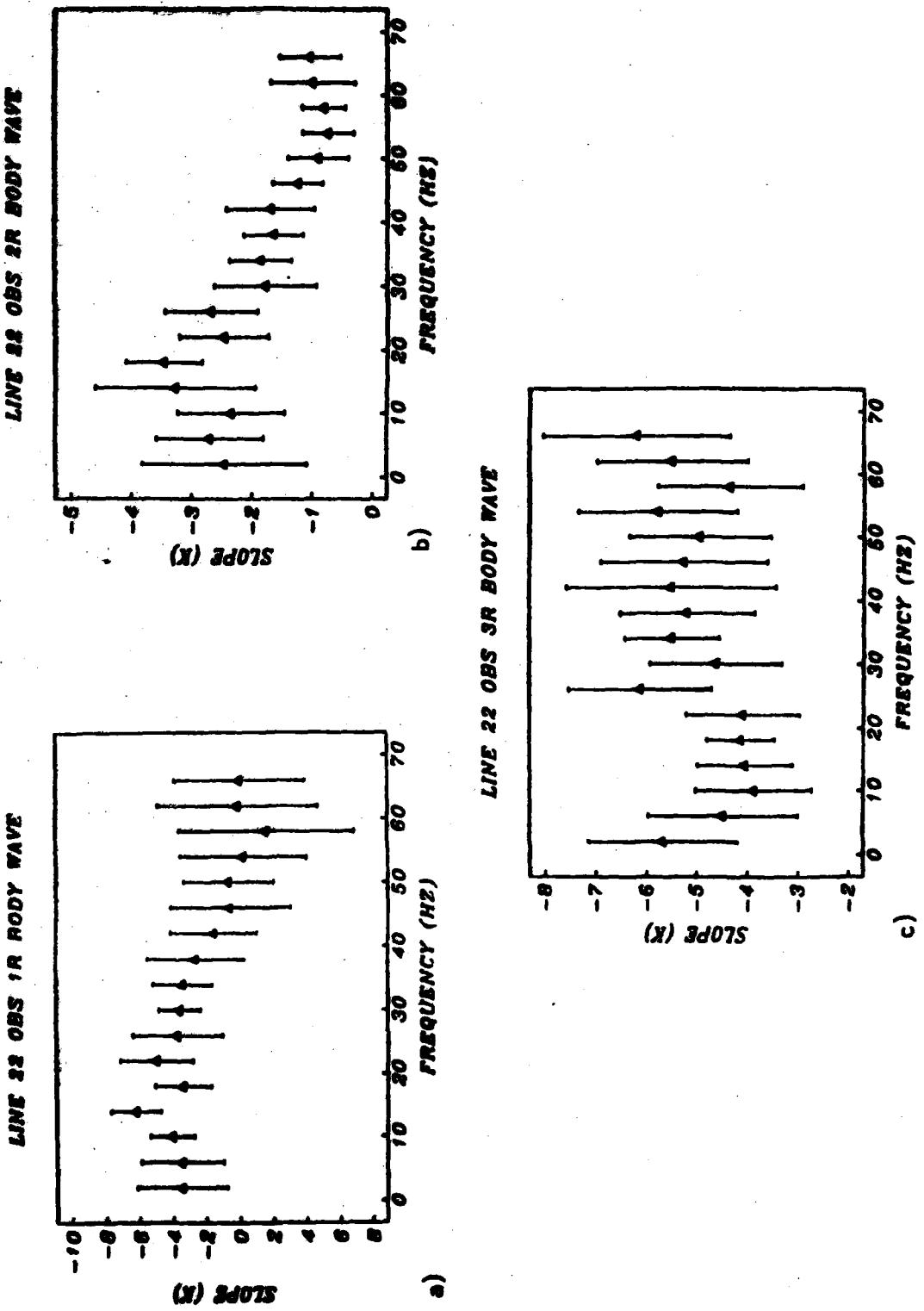


Fig. 13. Frequency dependence of the body-wave attenuation factor k for a) OBS#1, b) OBS#2 and c) OBS#3 of Line 22. Vertical bars indicate ranges of one standard deviation.

To evaluate the frequency dependence of the S/N ratios, we calculated the energy levels of the water-wave, body-wave and noise signals for shots in the 8 to 13 km distance range for each of the 17 frequency intervals defined above. There were between 6 and 11 traces in this range for the various OBS units. We then averaged the signal and noise power values in this range for each frequency interval and calculated S/N ratios for the ^{signal}_{noise} of interest (Figs. 14-16). For both the water waves and body waves, these data generally had the largest S/N levels in the 10 to 30 Hz passband. For most of the water-wave signals, substantial S/N values persisted out to about 60 Hz in spite of the -24 dB/octave rolloff of the instrumental response above 31 Hz. The S/N ratios for body waves were generally smaller than the water-wave S/N ratios by several orders of magnitude (20 to 30 dB) for all frequencies, an effect due to the low energy output of the SUS charges at low frequencies and the strong attenuation within the earth of the higher-frequency components.

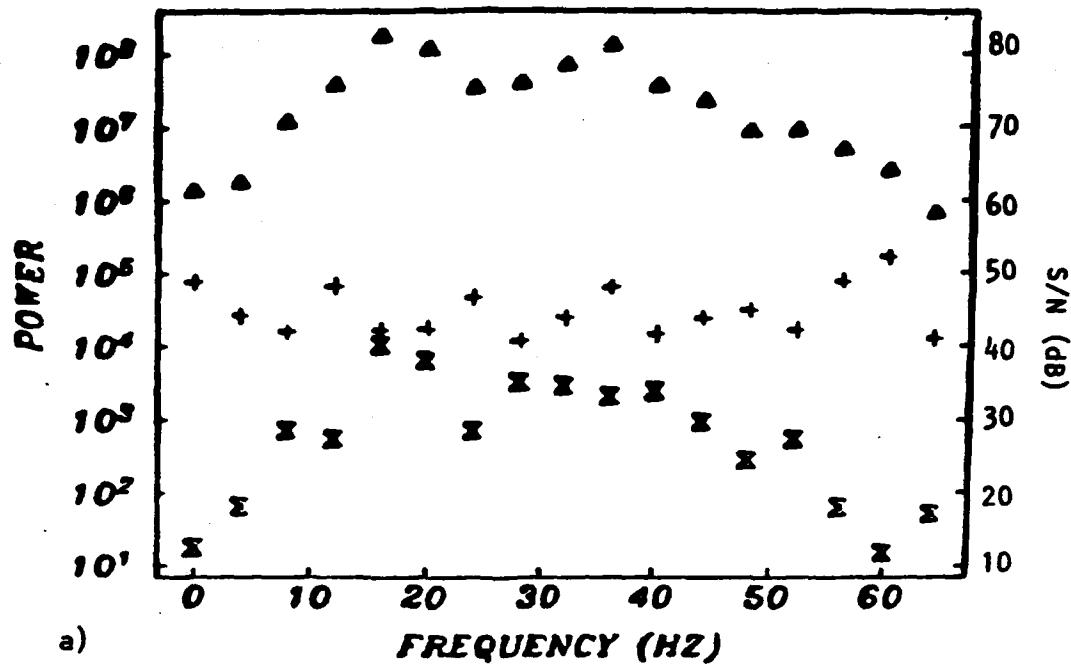
Generally, the noise spectra (Figs. 14-16) were nearly white despite the limited instrumental passband. Only OBS#2 on Line 21 showed a significant spectral peak corresponding to the instrumental response. Background noise on the ocean bottom in general increases with decreasing frequency (Asada and Shimamura, 1976; Latham and Sutton, 1966); therefore the observed noise below 10 Hz is likely to be due to true increases of ground noise. On the other hand, the noise above about 31 Hz is most likely to be due to inherent instrumental noise whose level is unaffected by the alias filter. It is this noise component which becomes an increasingly-dominant aspect of the S/N ratio for signals above 31 Hz and causes the apparent decrease in the absolute value of k in this band (Figs. 11-13). On Line 21 an additional peak in the S/N ratio (Fig. 14) is observed at about 40 Hz; this peak is due to the very strong high-frequency content of the water waves for the deep SUS shots.

We found that even though the body waves and water waves had somewhat characteristic spectra, there was nonetheless enough similarity in the 15 to 30 Hz range to make it impossible to design frequency filters that would significantly improve the detectability of the body waves on the seismic sections.

Geological Interpretation

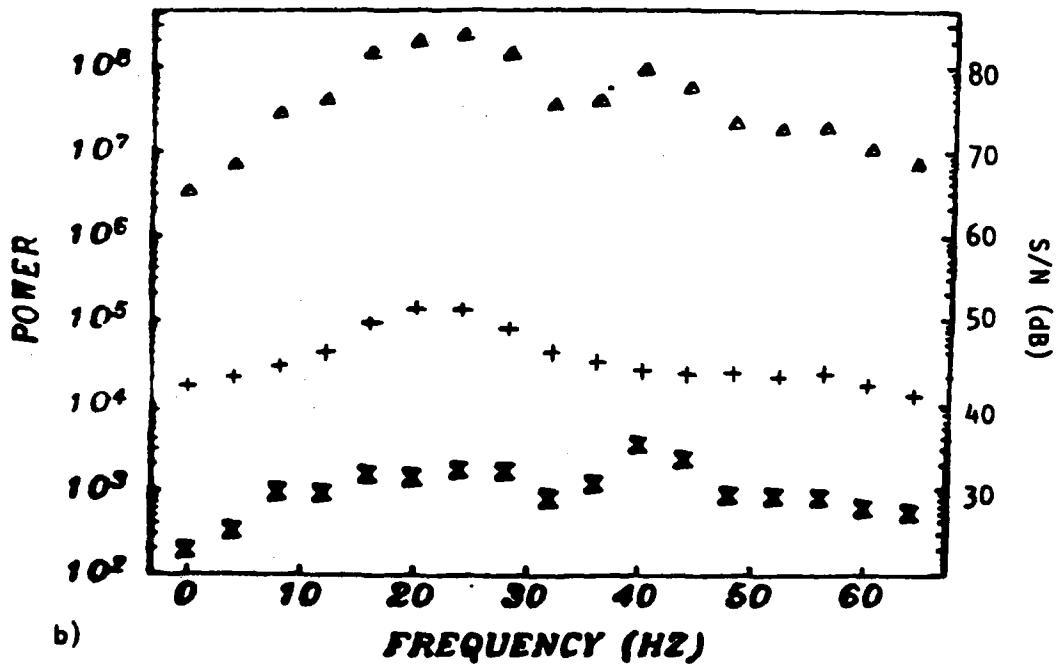
Very little geological information is available for the areas around Line 21 and Line 22. Surrounding areas in the Mediterranean show (Stanley, 1977) the persistent presence of a refracting layer at 0.25 to 1.0 km depth with an average P-wave velocity around 3.5 km/sec, overlain by a group of acoustic refractors (generally stratified at the top and acoustically transparent at the bottom) with P-wave velocities varying from 1.7 to 2.8 km/sec. The 3.5 km/sec refracting layer is probably interbedded marine sediments and evaporites of late Miocene age, and the overlying material is probably clay and silty clay deposited from Pliocene to Recent times.

OBS 1V SIGNAL, NOISE AND SIGNAL/NOISE



a)

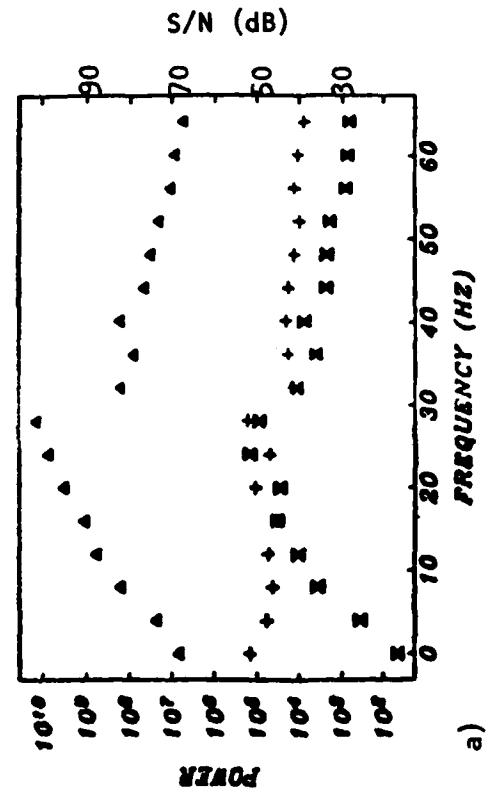
OBS 2V SIGNAL, NOISE AND SIGNAL/NOISE



b)

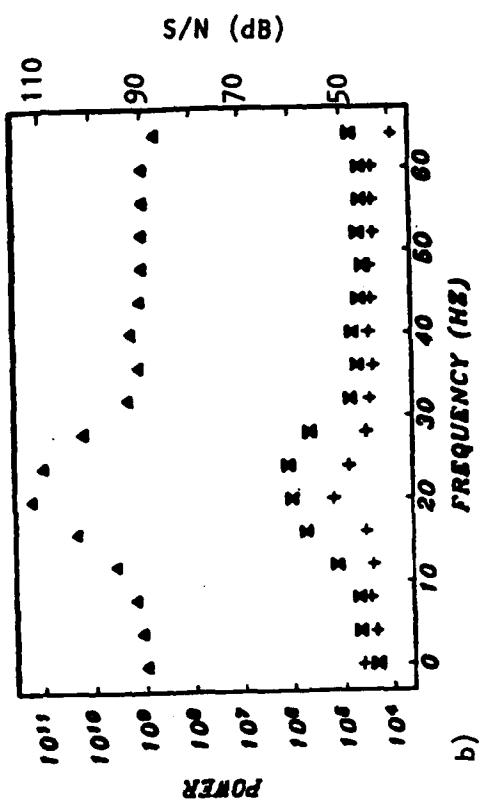
Fig. 14. Frequency dependence of the water-wave signal (Δ) and noise (+) energy levels (left scale, arbitrary units) and the S/N ratios (x) in dB for a) OBS#1 and b) OBS#2 of Line 21.

OBS IV SIGNAL, NOISE AND SIGNAL/NOISE



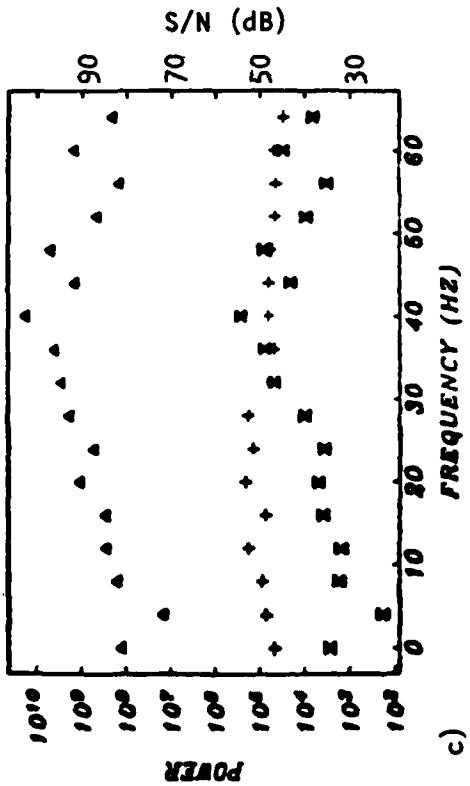
a)

OBS 2V SIGNAL, NOISE and SIGNAL/NOISE



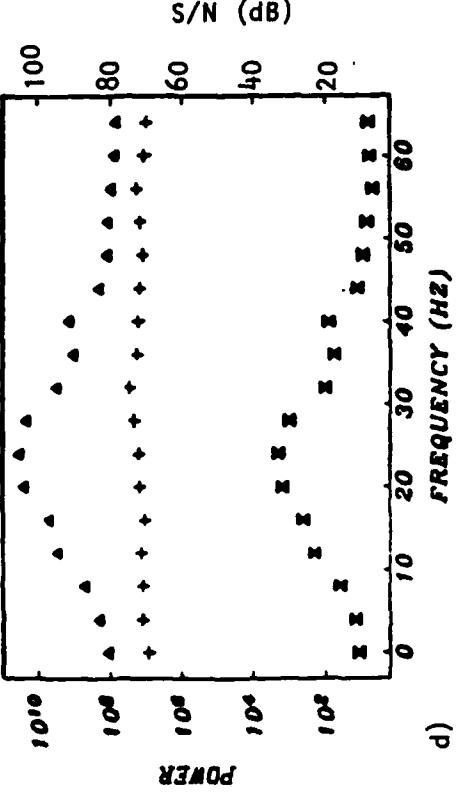
b)

OBS 3V SIGNAL, NOISE AND SIGNAL/NOISE



c)

OBS 4V SIGNAL, NOISE AND SIGNAL/NOISE



d)

Fig. 15. Frequency dependence of the water-wave signal (+) and noise (x) in dB for a) OBS#1, b) OBS#2, c) OBS#3 and d) OBS#4 of Line 22.

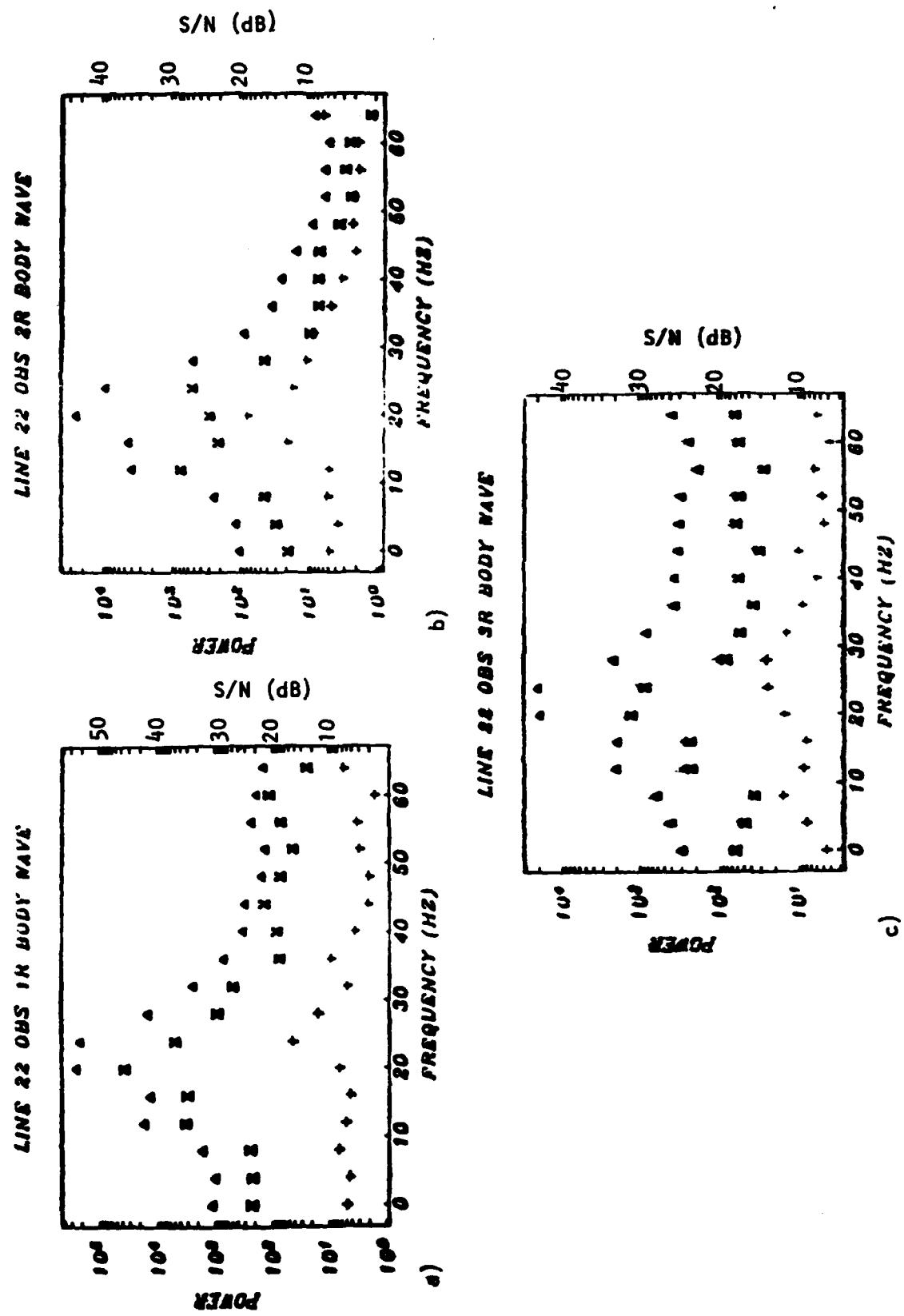


Fig. 16. Frequency dependence of the body-wave signal (▲) and noise (+) energy levels (left scale, arbitrary units) and the S/N ratios (x) in dB for a) OBS#1, b) OBS#2 and c) OBS#3 of Line 22.

No body waves were detected in any OBS data from Line 21, while on Line 22 the data showed two groups of refracted waves with apparent group velocities around 3.8 km/sec and 2.5 km/sec. The travel-time data for all the body-wave arrivals are plotted versus distance in Fig. 17. Note that the 3.8 km/sec layer was seen in three of the OBS units but that the 2.5 km/sec layer was clearly present only in OBS#3.

We inverted the apparent velocities and intercepts that were determined from the body-wave travel-time curves for OBS#1 and OBS#3 of Line 22 using the assumption that the layers were homogeneous and flat, and we derived a model for the upper crustal structure that is shown in Fig. 18. These refractors correlate well with those layers discussed above.

CONCLUSIONS

This experiment involved the use of low-frequency ground-motion transducers (the velocity-sensitive geophones inside each OBS with a 10 to 31 Hz passband) mounted on the ocean floor to detect water-borne and earth-borne signals from two distinct high-frequency sound sources (SUS Mark 61 at 244m and SUS Mark 82 at 91 m). The primary conclusions are summarized below:

1. There was sufficient low-frequency energy released by the SUS charges to generate detectable water waves and body waves within the 10 to 31 Hz passband of the OBS units. Water waves were detected by all three geophones on all OBS units for both types of SUS. However body waves were detected only on the horizontal-geophone data and only for the SUS Mark 82 detonated at 91m. In particular:
 - a. Acoustic signals were transmitted through the water column and detected by the OBS units to distances of over 75 km.
 - b. At 75 km distance the average water-wave S/N ratio was 10 dB (estimated) for deep SUS shots and was 28 dB (observed) for shallower SUS shots.
 - c. The maximum distance for detecting refracted body waves for Line 22 ranged from 14 to 20 km.
 - d. The average S/N ratio at 15 km for the body wave signals was 18 dB for Line 22.
2. The attenuation of the water waves and body waves detected by the OBS units varied in a regular (but different) fashion with distance for the two water depth regimes. In particular:
 - a. For water waves, the values for the energy attenuation factor k indicated that in deep water the loss was due primarily to spherical divergence and that in shallower water the loss was due to a combination of cylindrical and spherical divergence.

LINE 22 BODY WAVE DATA

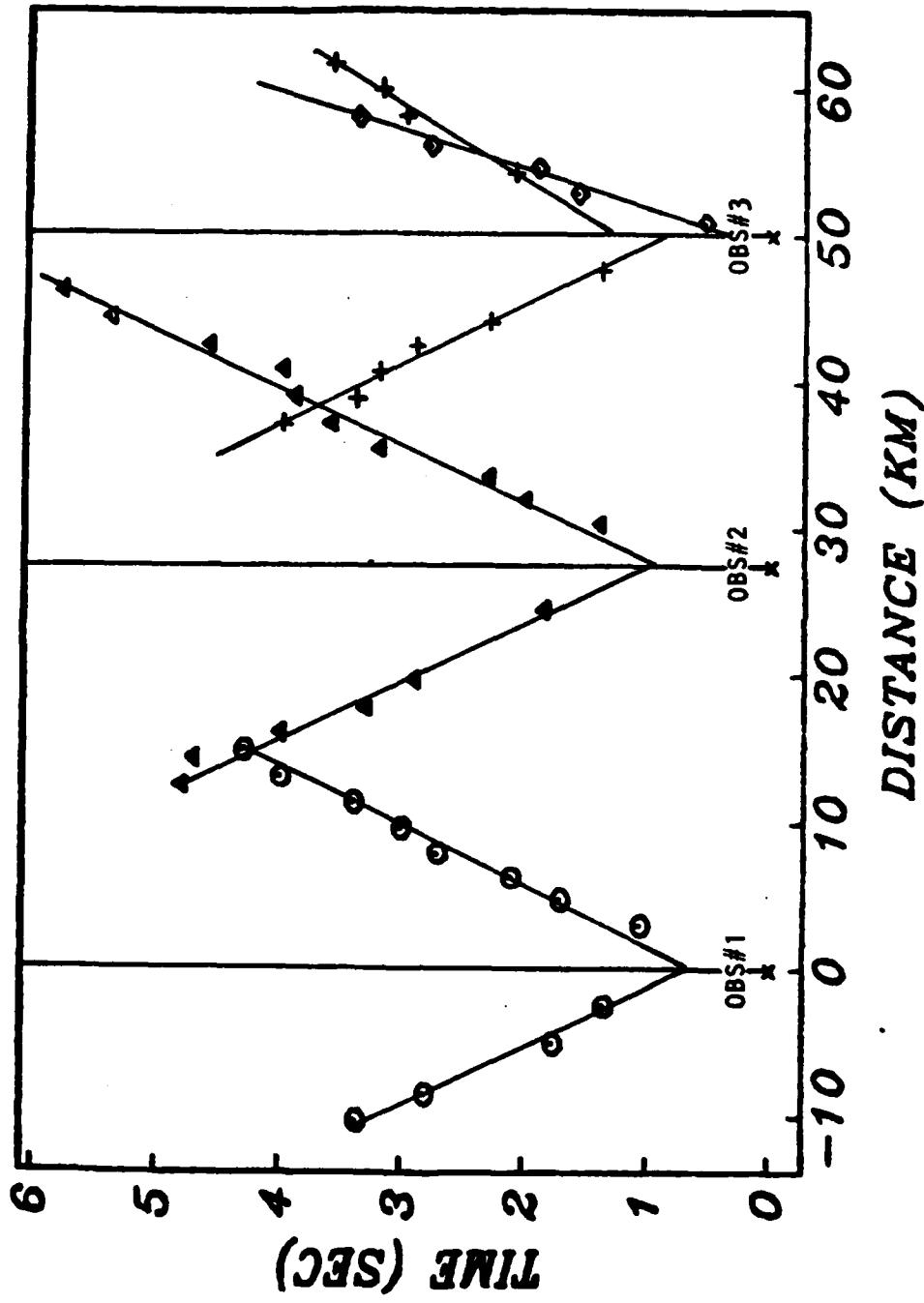


Fig. 17. Travel-time data for the body-wave arrivals from Line 22.

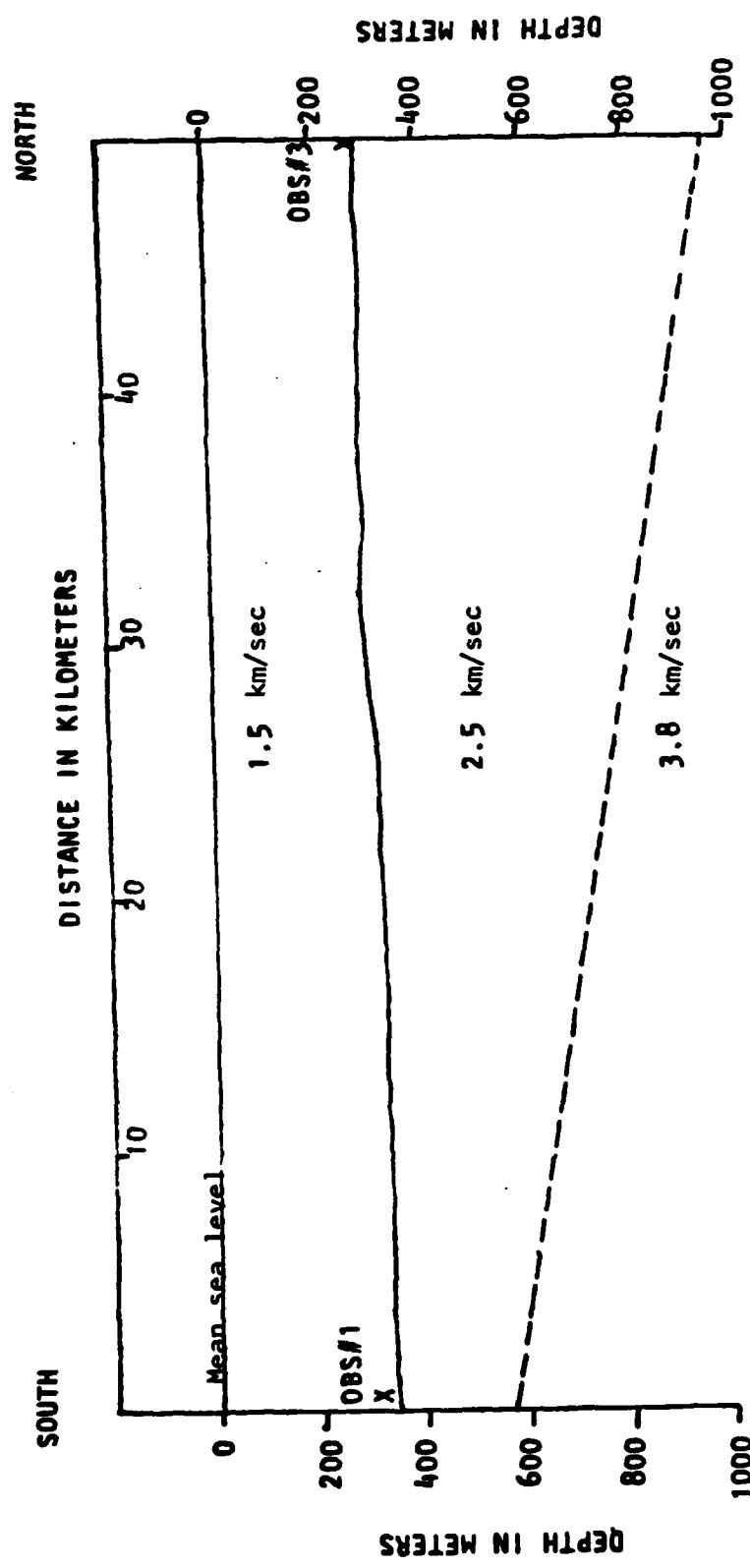


Fig. 18. Crustal model for Line 22 derived from OBS#1 and OBS#3 body-wave data.

b. The attenuation factors k were much larger for the body waves than for the water waves, an effect due to the greater diversity of signal-loss mechanisms in the solid and semisolid earth.

3. For water waves the variation of the attenuation factor k with frequency displayed no consistent pattern. In particular, there was no evidence for an increase in k with increasing frequency between 0 and 68 Hz.

4. The geological interpretation of the refraction data for the region near Line 21 suggests the presence of a layer with P-wave velocity of 3.8 km/sec at 0.6 km depth at OBS#1 and at 1.0 km depth at OBS#3. Data from OBS#3 indicate that the 3.8 km/sec layer is overlain by a layer with P-wave velocity of 2.5 km/sec.

RECOMMENDATIONS

In light of the finding that OBS units detected water waves and body waves from high-frequency SUS charges, it is important that future investigators using these types of equipment carefully specify their objectives and modify the equipment and field procedures accordingly. In this experiment the instrumental response of the OBS was not designed to take advantage of the spectral characteristics of the sound source, and the sound sources generated very little energy at the 3 to 15 Hz frequencies that travel substantial distances through the earth. Therefore the following factors should be considered:

1. If the objective is to study high-frequency propagation, then the sampling rate of the OBS should be increased so that the Nyquist frequency is well above the frequency range of interest. In this case deep SUS shots should be used, and they should be fired as densely as possible. Waterguns might be considered as possible sound sources.

2. If the objective is to study low-frequency propagation, then either the SUS shots should be detonated much closer to the sea surface and as densely as possible, or else a more appropriate source should be used. We have had considerable success using large explosives detonated at a depth of one-fourth the wavelength of the bubble frequency and have recorded strong body-wave signals with the OBS at ranges up to 100 km. Airguns are an alternate source; we have used the large low-frequency twin 2000 PSI (13.8 MPa) 2000 cubic inch (33 liter) airguns on the UTIG vessel R/V Fred Moore and have recorded body-wave arrivals on the OBS units to distances of over 65 km. The use of airguns permits shot spacings of less than 100 m (in contrast to the 0.9 km and 1.7 km spacing of these experiments) which makes it possible to use tau-P and other slant-stacking procedures in processing the data. We have found that the closely-spaced airgun shots enable us to resolve the structure of the near-surface sediment layer in greater detail than was possible using explosives.

Acknowledgments

We would like to recognize the captain and crew of the USNS Wilkes for their efficient and cordial handling of all ship-related details and to give credit to Roger Merrifield for skillfully coordinating the many scientific phases of the survey. Paul L. Donoho designed the OBS, and he and Paul M. McPherson were responsible for the successful operation of the units. We thank Yosio Nakamura for his many helpful suggestions in preparing this report and also thank Cliff Frohlich and Dale Sawyer for reading the manuscript and offering constructive comments.

REFERENCES

- Asada, Toshi and Hideki Shimamura, Observation of Earthquakes and Explosions at the Bottom of the Western Pacific: Structure of Oceanic Lithosphere Revealed by Longshot Experiment, in The Geophysics of the Pacific Ocean Basin and Its Margin, George H. Sutton, Murli H. Manghnani and Ralph Moberly, eds., pp. 135-143, American Geophysical Union, Washington, 1976.
- Barry, K.M., D. A. Cavers and C. W. Kneale, Recommended Standards for Digital Tape Formats, in Digital Tape Standards, pp. 22-30, Society of Exploration Geophysicists, Tulsa, 1980.
- Gaspin, Joel B. and Verna K. Shuler, Source Levels of Shallow Underwater Explosions, Technical Report NOLTR 71-160, Naval Ordnance Laboratory, White Oak, Silver Spring, 1971.
- Latham, G., P. Donoho, K. Griffiths, A. Roberts and A. K. Ibrahim, The Texas Ocean-Bottom Seismograph, Proc. Offshore Technology Conf., OTC#3233, 1467-1476, 1978.
- Latham, Gary V. and George H. Sutton, Seismic Measurements on the Ocean Floor, I, Bermuda Area, J. Geophys. Res., 71, 2545-2573, 1966.
- Stanley, Daniel Jean, Post-Miocene Depositional Patterns and Structural Displacement in the Mediterranean, in The Ocean Basins and Margins, vol 4A, Alan E. M. Nairn, William H. Kanes and Francis G. Stehli, eds., pp. 77-150, Plenum Press, New York, 1977.
- Steinmetz, R. L., P. L. Donoho, J. D. Murff and G. V. Latham, Coupling of a Strong Motion Ocean Bottom Seismometer, Proc. Offshore Technology Conf., OTC#3615, 2235-2249, 1979.
- Sutton, G. H., F. K. Duennebier, B. Iwatake, Coupling of Ocean Bottom Seismometers to Soft Bottoms, Marine Geophys. Res., 5, 35-51, 1981.
- Vidmar, Paul J., The Dependence of Bottom Reflection Loss on the Geo-acoustic Parameters of Deep Sea (Solid) Sediments, J. Acoust. Soc. Am., 68, 1442-1453, 1980.

APPENDIX A

OBS LOCATIONS AND DEPTHS

LINE 21

	<u>LATITUDE</u>	<u>LONGITUDE</u>	<u>WATER DEPTH(m)</u>
OBS #1	36°13.4'N	12°51.6'E	910
OBS #2	36°23.2'N	12°41.0'E	1275
OBS #3	36°32.4'N	12°30.0'E	1300

LINE 22

	<u>LATITUDE</u>	<u>LONGITUDE</u>	<u>WATER DEPTH(m)</u>
OBS #1	34°19.0'N	14°12.0'E	337
OBS #2	34°33.8'N	14°12.0'E	305
OBS #3	34°46.0'N	14°12.3'E	390
OBS #4	35°01.1'N	14°13.0'E	465

Line 21 Shot Coordinates and Distances to OBS Units

SHOT NO.	LATITUDE north	LONGITUDE east	DISTANCE, km., TO		
			OBS #1	OBS #2	OBS #3
1	(none)				
2	36 31.35	12 32.60	43.70	19.61	4.34
3	36 31.05	12 33.05	42.84	18.76	5.19
4	36 30.65	12 33.50	41.84	17.76	6.15
5	36 30.35	12 34.00	40.94	16.86	7.07
6	36 30.05	12 34.45	40.08	16.01	7.94
7	36 29.65	12 34.90	39.08	15.01	8.91
8	36 29.35	12 35.35	38.22	14.17	9.78
9	36 29.05	12 35.85	37.32	13.28	10.71
10	36 28.65	12 36.30	36.32	12.29	11.69
11	36 28.35	12 36.75	35.47	11.43	12.56
12	36 28.05	12 37.25	34.57	10.58	13.49
13	36 27.70	12 37.70	33.64	9.67	14.41
14	36 27.35	12 38.15	32.72	8.78	15.34
15	36 27.05	12 38.60	31.87	7.97	16.21
16	36 26.65	12 39.10	30.83	6.98	17.26
17	36 26.25	12 39.55	29.83	6.04	18.24
18	36 25.95	12 40.00	28.98	5.30	19.11
19	36 25.55	12 40.40	28.03	4.44	20.04
20	36 25.15	12 40.80	27.08	3.62	20.98
21	36 24.85	12 41.15	26.33	3.06	21.73
22	36 24.45	12 41.55	25.38	2.45	22.67
23	36 24.05	12 41.95	24.43	2.12	23.60
24	36 23.75	12 42.35	23.62	2.26	24.42
25	36 23.35	12 42.75	22.67	2.63	25.36
26	36 23.00	12 43.15	21.80	3.24	26.23
27	36 22.65	12 43.55	20.93	3.95	27.11
28	36 22.25	12 43.95	19.98	4.75	28.05
29	36 21.90	12 44.35	19.10	5.56	28.93
30	36 21.55	12 44.75	18.23	6.39	29.81
31	36 21.15	12 45.15	17.28	7.27	30.75
32	36 20.80	12 45.55	16.41	8.12	31.63
33	36 20.45	12 45.95	15.54	8.98	32.50
34	36 20.05	12 46.35	14.60	9.90	33.45
35	36 19.65	12 46.75	13.65	10.82	34.39
36	36 19.30	12 47.15	12.79	11.69	35.27
37	36 18.95	12 47.55	11.92	12.56	36.15
38	36 18.55	12 47.95	10.98	13.49	37.09
39	36 18.15	12 48.35	10.04	14.43	38.04
40	36 17.80	12 48.75	9.19	15.30	38.92
41	36 17.45	12 49.15	8.34	16.18	39.80
42	36 17.05	12 49.55	7.42	17.12	40.74
43	36 16.65	12 49.95	6.50	18.06	41.69
44	36 16.30	12 50.35	5.68	18.94	42.57
45	36 15.95	12 50.75	4.89	19.82	43.45
46	36 15.55	12 51.15	4.03	20.76	44.40
47	36 15.25	12 51.55	3.42	21.57	45.21
48	36 14.95	12 51.90	2.90	22.34	45.98
49	36 14.55	12 52.25	2.34	23.23	46.87
50	36 14.25	12 52.65	2.22	24.04	47.68
51	36 13.95	12 53.05	2.40	24.86	48.50
52	36 13.55	12 53.45	2.79	25.80	49.45
53	36 13.20	12 53.85	3.39	26.68	50.33
54	36 12.85	12 54.25	4.10	27.56	51.21
55	36 12.45	12 54.65	4.90	28.51	52.16
56	36 12.05	12 55.05	5.74	29.46	53.11
57	36 11.65	12 55.50	6.68	30.46	54.11
58	36 11.30	12 55.90	7.52	31.34	54.99

Line 22 Shot Coordinates and Distances to OBS Units

SHOT NO.	LATITUDE		LONGITUDE		DISTANCE, km, TO			
	north	east			OBS #1	OBS #2	OBS #3	OBS #4
1	(none)							
2	(none)							
3	35 0.50	14 14.00			76.79	49.46	26.94	1.88
4	34 59.40	14 13.90			74.73	47.42	24.90	3.43
5	34 58.40	14 13.80			72.90	45.57	23.04	5.14
6	34 57.30	14 13.80			70.87	43.54	21.02	7.13
7	34 56.30	14 13.70			69.01	41.68	19.16	8.94
8	34 55.20	14 13.60			66.97	39.64	17.13	10.95
9	34 54.30	14 13.50			65.31	37.97	15.45	12.60
10	34 53.30	14 13.40			63.45	36.12	13.60	14.43
11	34 52.40	14 13.30			61.78	34.45	11.93	16.09
12	34 51.50	14 13.20			60.12	32.78	10.26	17.75
13	34 50.50	14 13.10			58.26	30.92	8.41	19.60
14	34 49.60	14 13.00			56.60	29.25	6.74	21.26
15	34 48.60	14 12.90			54.74	27.40	4.89	23.11
16	34 47.70	14 12.80			53.08	25.73	3.23	24.78
17	34 46.70	14 12.70			51.22	23.87	1.43	26.63
18	34 45.80	14 12.60			49.56	22.21	0.39	28.30
19	34 44.80	14 12.50			47.71	20.35	2.24	30.15
20	34 43.90	14 12.50			46.04	18.69	3.89	31.81
21	34 42.90	14 12.50			44.19	16.84	5.74	33.66
22	34 41.90	14 12.40			42.34	14.99	7.58	35.51
23	34 41.00	14 12.40			40.68	13.33	9.25	37.18
24	34 40.00	14 12.30			38.83	11.47	11.09	39.03
25	34 39.10	14 12.30			37.16	9.81	12.76	40.69
26	34 38.10	14 12.20			35.31	7.96	14.61	42.54
27	34 37.10	14 12.20			33.47	6.11	16.46	44.39
28	34 36.20	14 12.10			31.80	4.44	18.12	46.06
29	34 35.20	14 12.10			29.95	2.59	19.97	47.91
30	34 34.30	14 12.00			28.29	0.92	21.64	49.58
31	34 33.40	14 12.00			26.62	0.74	23.30	51.24
32	34 32.40	14 12.00			24.77	2.59	25.15	53.09
33	34 31.50	14 12.10			23.11	4.25	26.81	54.75
34	34 30.50	14 12.10			21.26	6.10	28.66	56.59
35	34 29.60	14 12.10			19.60	7.77	30.32	58.26
36	34 28.60	14 12.10			17.75	9.62	32.17	60.11
37	34 27.70	14 12.20			16.09	11.28	33.84	61.77
38	34 26.70	14 12.20			14.24	13.13	35.68	63.61
39	34 25.80	14 12.20			12.58	14.79	37.35	65.28
40	34 24.80	14 12.30			10.73	16.63	39.20	67.12
41	34 23.90	14 12.30			9.07	18.31	40.86	68.79
42	34 22.90	14 12.30			7.22	20.16	42.71	70.64
43	34 21.90	14 12.40			5.40	22.01	44.56	72.48
44	34 20.90	14 12.40			3.57	23.86	46.41	74.33
45	34 19.90	14 12.40			1.77	25.71	48.26	76.18
46	34 18.90	14 12.40			0.64	27.53	50.10	78.03
47	34 17.90	14 12.50			2.17	29.41	51.93	79.88
48	34 16.90	14 12.50			3.96	31.25	53.80	81.73
49	34 15.90	14 12.50			5.78	33.10	55.65	83.57
50	34 14.90	14 12.60			7.64	34.93	57.50	85.42
51	34 13.90	14 12.60			9.47	36.80	59.35	87.27
52	34 12.90	14 12.60			11.32	38.63	61.20	89.12
53	34 11.90	14 12.60			13.16	40.50	63.05	90.97
54	34 10.90	14 12.70			15.01	42.33	64.90	92.81
55	34 10.00	14 12.70			16.67	44.01	66.56	94.48

APPENDIX B Seismic Record Sections

This appendix contains a complete set of seismic record sections in three parts:

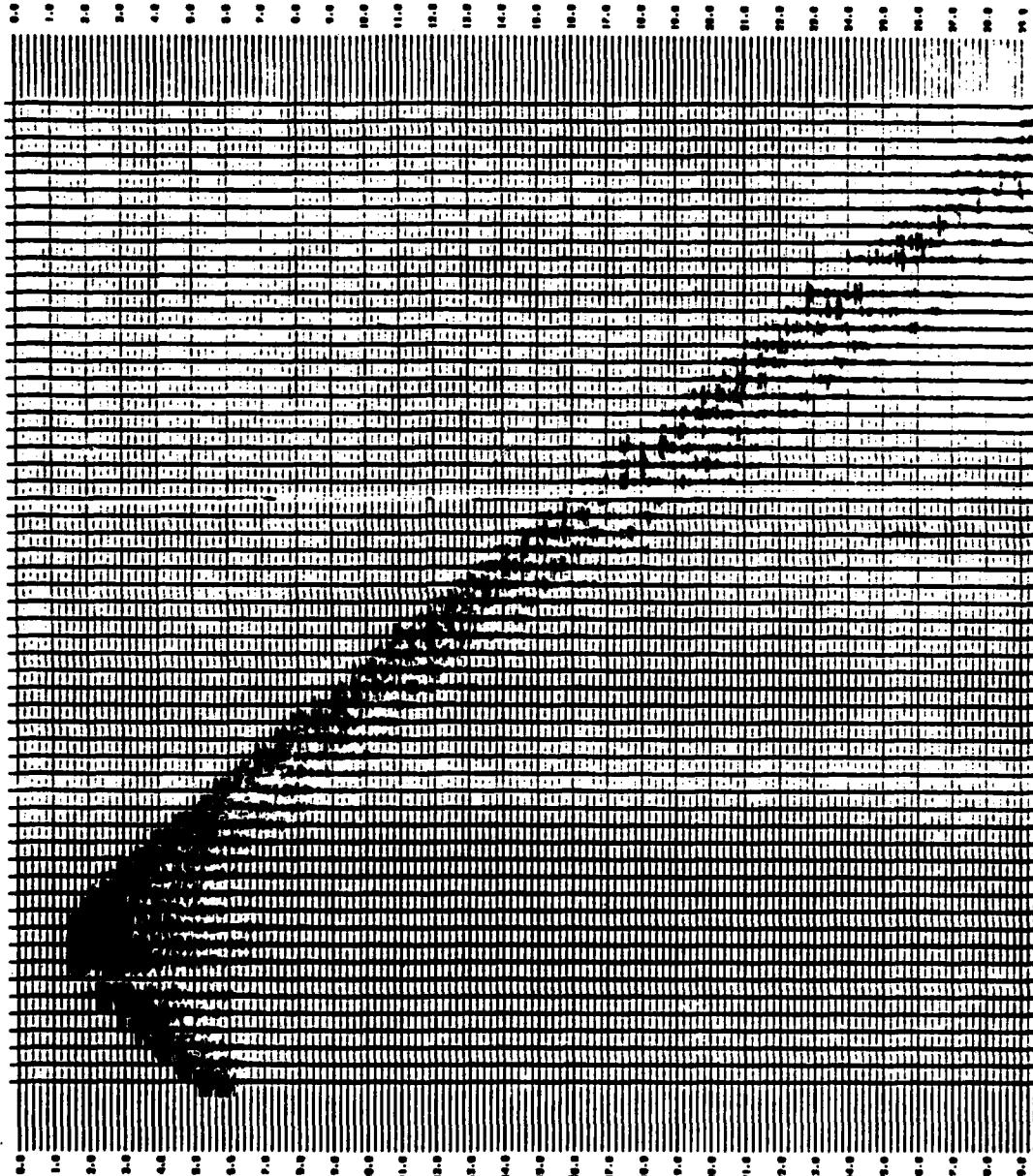
	<u>Page</u>
Part 1. Raw data	B- 2
Part 2. Rotated and reduced at 1.7 km/s	B-23
Part 3. Rotated and reduced at 4.5 km/s	B-44

On each figure, the boxes on top and bottom contain the line number (21 or 22), OBS number, and component (vertical, horizontal-1, horizontal-2, radial or transverse). The last two digits of the four digit numbers on the left margin represent the shot number as listed in Appendix A. The time, given at the top and the bottom in seconds, increases from left to right.

PROJECT : SICILY SICILY 21 0880 1 VERTICAL (RAW DATA) LINE 1
 22-APR-1983 10:19:23.17 JOB NO. 7962
 POLARITY NORMAL - POSITIVE DATA(49997 MILLS 07.344)
 SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE PANEL NO. 1
 REF. = 8.3142E+03

PP 19

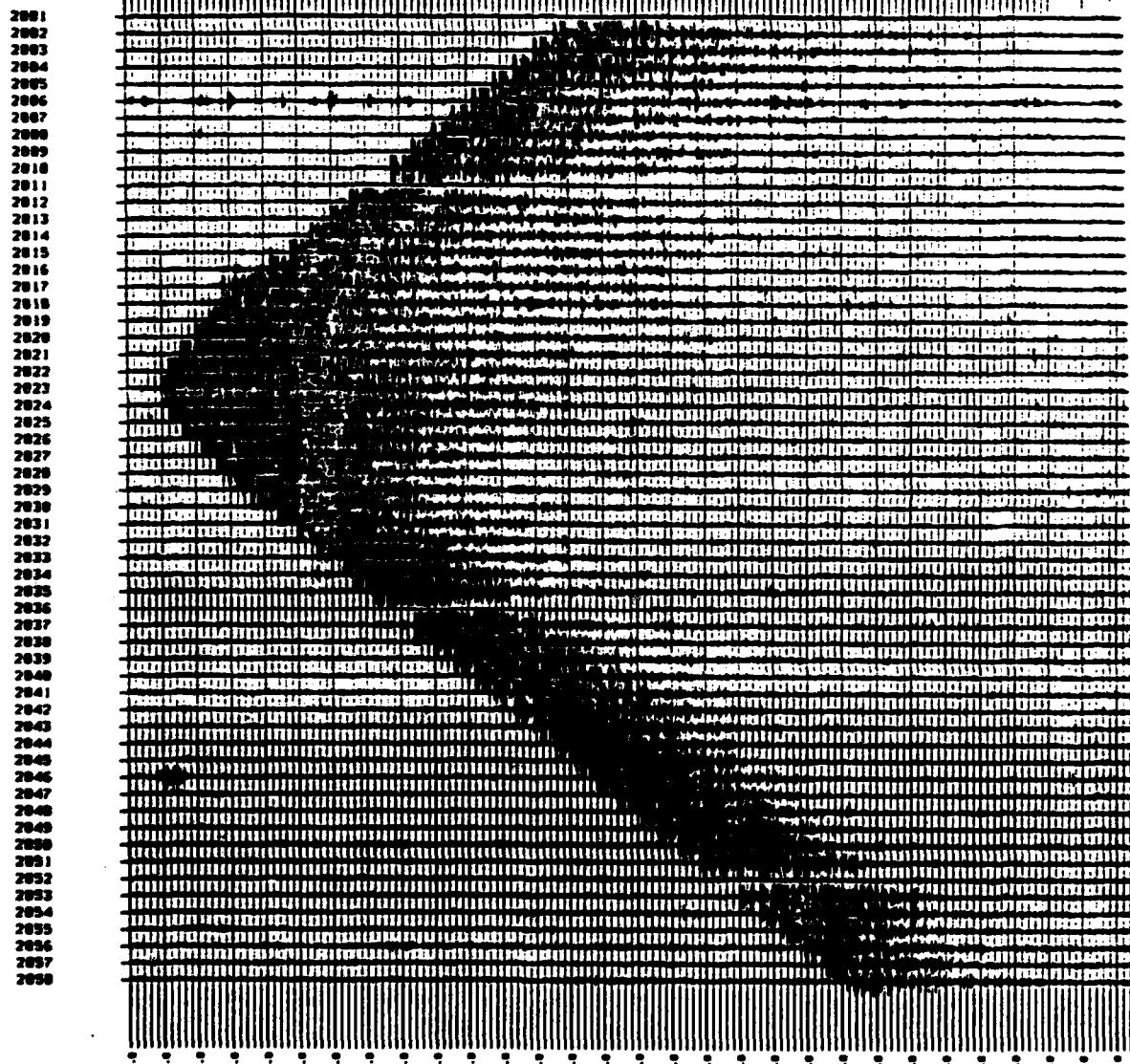
1001
 1002
 1003
 1004
 1005
 1006
 1007
 1008
 1009
 1010
 1011
 1012
 1013
 1014
 1015
 1016
 1017
 1018
 1019
 1020
 1021
 1022
 1023
 1024
 1025
 1026
 1027
 1028
 1029
 1030
 1031
 1032
 1033
 1034
 1035
 1036
 1037
 1038
 1039
 1040
 1041
 1042
 1043
 1044
 1045
 1046
 1047
 1048
 1049
 1050
 1051
 1052
 1053
 1054
 1055
 1056
 1057
 1058



PROJECT : SICILY SICILY 21 0880 1 VERTICAL (RAW DATA) LINE 1
 22-APR-1983 10:19:23.17 JOB NO. 7962
 POLARITY NORMAL - POSITIVE DATA(49997 MILLS 07.344)
 SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE PANEL NO. 1
 REF. = 8.3142E+03

PROJECT : SICILY SICILY 21 OBSO 2 VERTICAL (RAW DATA) LINE 1
 22-APR-1983 10:10:16.27 JOB NO. 7864
 POLARITY NORMAL - POSITIVE DATA(49997 MILLS 07.344) PANEL NO. 1
 SECOND AVERAGE USING 4 WINDOW OVER ENTIRE TRACE REF. = 8.8928E+02

PPTD

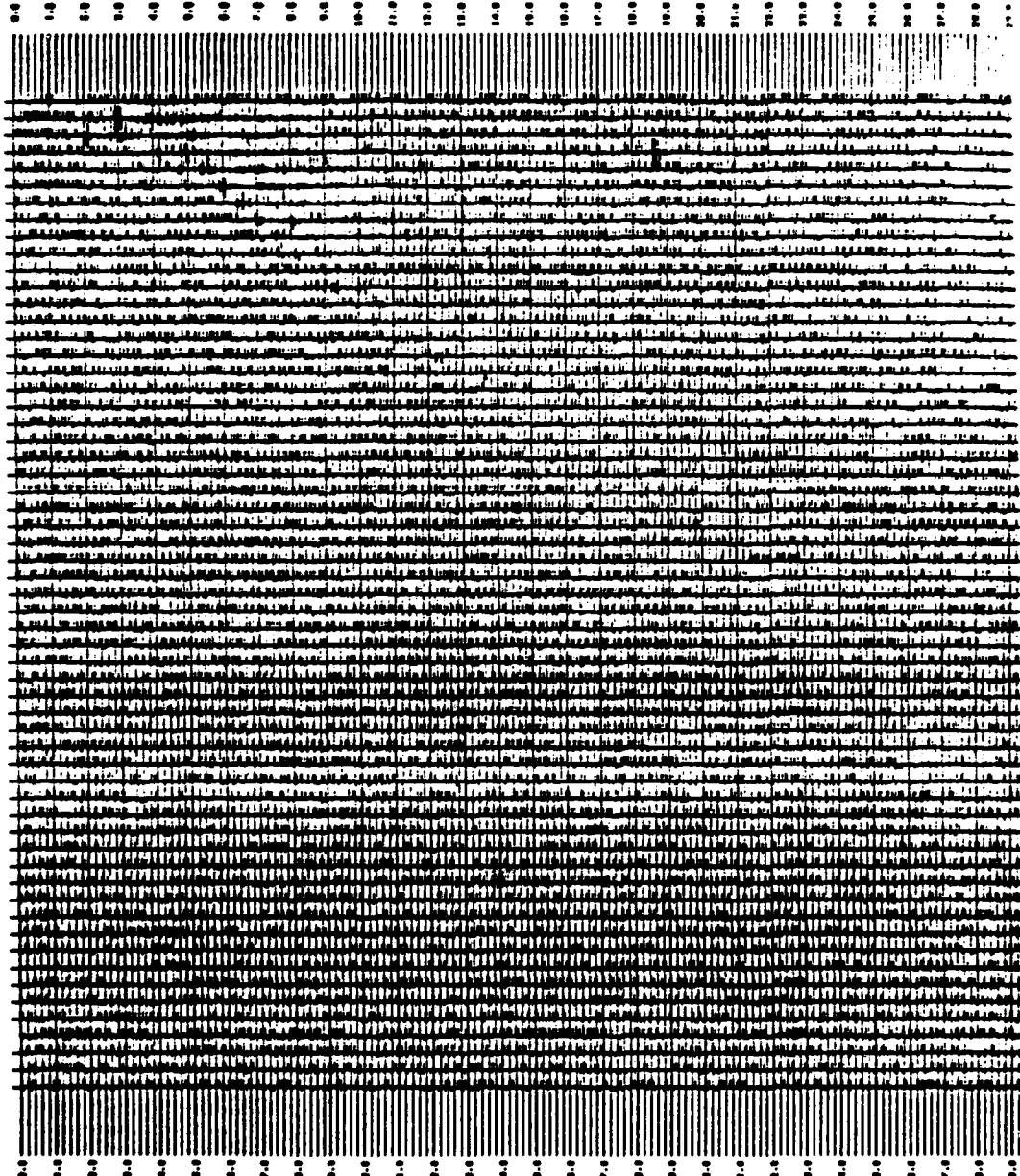


PROJECT : SICILY	SICILY 21 OBSO 2 VERTICAL (RAW DATA)	LINE 1
POLARITY NORMAL - POSITIVE	DATA(49997 MILLS 07.344)	JOB NO. 7864
SECOND AVERAGE USING 4 WINDOW OVER ENTIRE TRACE	REF. = 8.8928E+02	PANEL NO. 1

PROJECT : SICILY SICILY 21 085+ 3 VERTICAL CRU DATA.
 22-MP-1963 10:21:05.60 LINE 1
 POLARITY NORMAL - POSITIVE DATA(49997 MILLS 07.344) JOB NO. 7968
 SECOND AVERAGE USING 4 VINTAGE OVER ENTIRE TRACE PANEL NO. 1
 REF. = 0.1158E+04

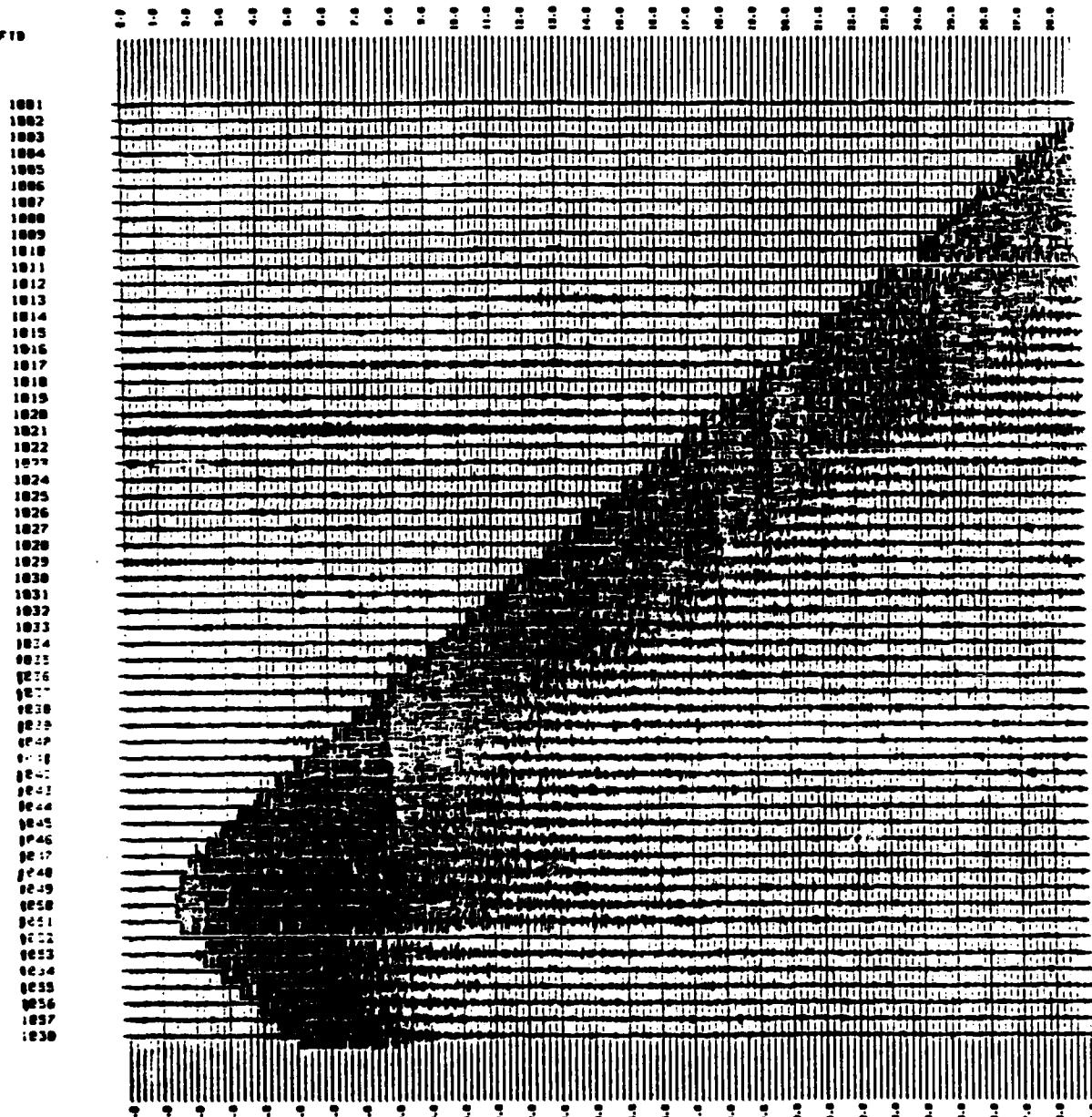
FF10

3001
 3002
 3003
 3004
 3005
 3006
 3007
 3008
 3009
 3010
 3011
 3012
 3013
 3014
 3015
 3016
 3017
 3018
 3019
 3020
 3021
 3022
 3023
 3024
 3025
 3026
 3027
 3028
 3029
 3030
 3031
 3032
 3033
 3034
 3035
 3036
 3037
 3038
 3039
 3040
 3041
 3042
 3043
 3044
 3045
 3046
 3047
 3048
 3049
 3050
 3051
 3052
 3053
 3054
 3055
 3056
 3057
 3058



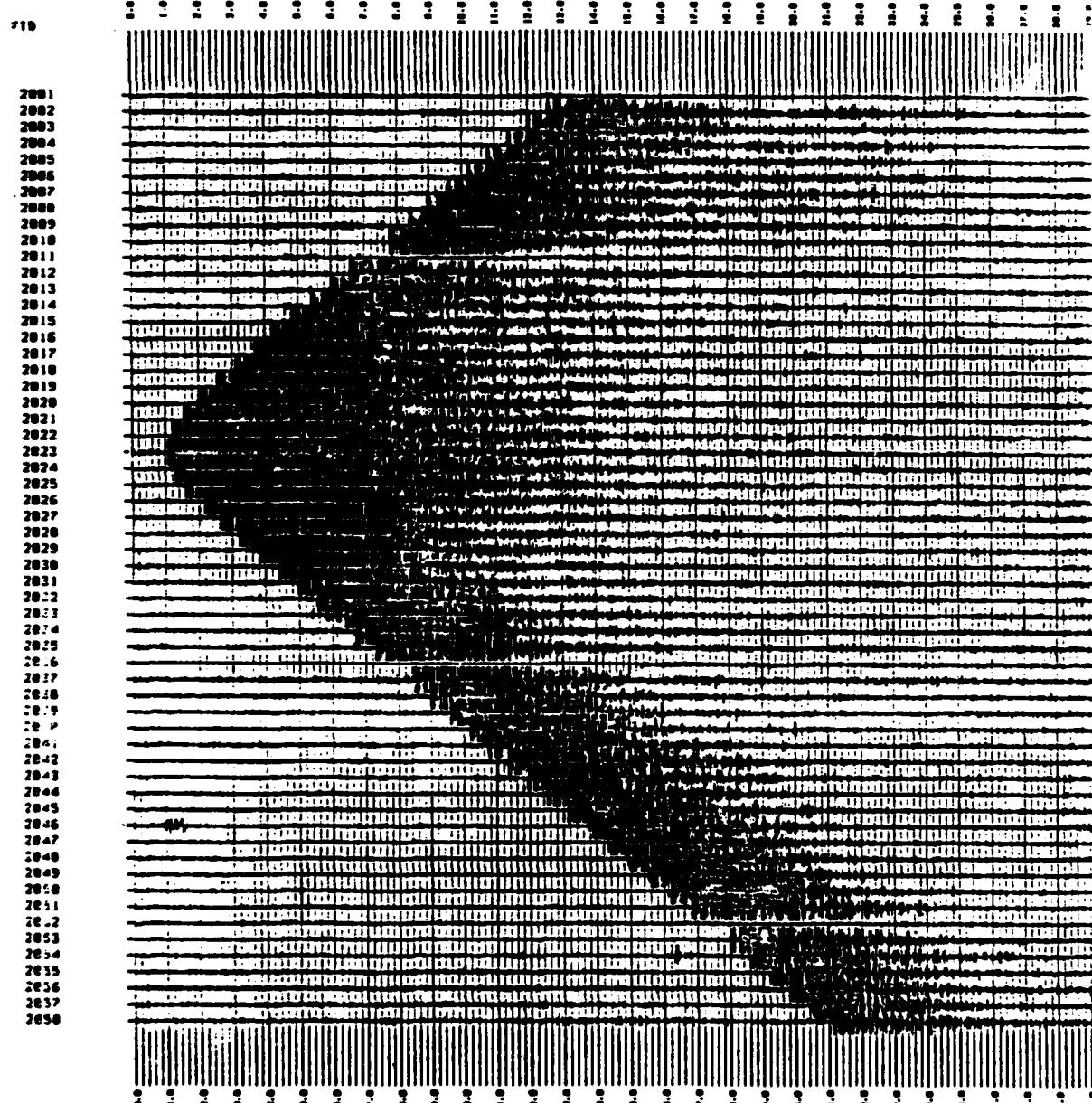
SECOND AVERAGE USING 4 VINTAGE OVER ENTIRE TRACE
 0071 = 0.1158E+04
 POLARITY NORMAL - POSITIVE DATA(49997 MILLS 07.344)
 22-MP-1963 10:21:05.60 LINE 1
 JOB NO. 7968
 REF. = 0.1158E+04

PROJECT : SICILY SICILY 21 OBS-1 H1 (RAW DATA) LINE 1
 22-APR-1983 14:44:00.39 JOB NO. 8837
 POLARITY NORMAL - POSITIVE DATA(49997 MILLS 07.344) PANEL NO. 1
 SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE REF. = 8.1358E+03



PROJECT : SICILY SICILY 21 OBS-1 H1 (RAW DATA)	LINE 1
POLARITY NORMAL - POSITIVE DATA(49997 MILLS 07.344)	PANEL NO. 1
SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE	REF. = 8.1358E+03
22-APR-1983 14:44:00.39	JOB NO. 8837

PROJECT : SICILY SICILY 21 0850 2 H1 (RAU DATA) LINE 1
 22-APR-1983 14:46:58.20 JOB NO. 8830
 POLARITY NORMAL - POSITIVE DATA(49997 MILLS 07.344) PANEL NO. 1
 SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE REF. = 0.1782E+03



PROJECT : SICILY	SICILY 21 0850 2 H1	(RAU DATA)	LINE	1
POLARITY	NORMAL - POSITIVE	DATA(49997 MILLS 07.344)	PANEL NO.	1
SECOND	AVERAGE	USING 4 WINDOWS OVER ENTIRE TRACE	REF.	0.1782E+03
22-APR-1983	14:46:58.20			

PROJECT : SICILY SICILY 21 0850 3 H1 (RNU DATA) LINE 1
 -22-APR-1983 14:49:52-14 JOB NO. 8848
 POLARITY NORMAL - POSITIVE DATA(49997 MILLS 07.344) PANEL NO. 1
 SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE REF. = 0.125E+04

FID

3001

3002

3003

3004

3005

3006

3007

3008

3009

3010

3011

3012

3013

3014

3015

3016

3017

3018

3019

3020

3021

3022

3023

3024

3025

3026

3027

3028

3029

3030

3031

3032

3033

3034

3035

3036

3037

3038

3039

3040

3041

3042

3043

3044

3045

3046

3047

3048

3049

3050

3051

3052

3053

3054

3055

3056

3057

3058

3059

3060

3061

3062

3063

3064

3065

3066

3067

3068

3069

3070

3071

3072

3073

3074

3075

3076

3077

3078

3079

3080

3081

3082

3083

3084

3085

3086

3087

3088

3089

3090

3091

3092

3093

3094

3095

3096

3097

3098

3099

3100

3101

3102

3103

3104

3105

3106

3107

3108

3109

3110

3111

3112

3113

3114

3115

3116

3117

3118

3119

3120

3121

3122

3123

3124

3125

3126

3127

3128

3129

3130

3131

3132

3133

3134

3135

3136

3137

3138

3139

3140

3141

3142

3143

3144

3145

3146

3147

3148

3149

3150

3151

3152

3153

3154

3155

3156

3157

3158

3159

3160

3161

3162

3163

3164

3165

3166

3167

3168

3169

3170

3171

3172

3173

3174

3175

3176

3177

3178

3179

3180

3181

3182

3183

3184

3185

3186

3187

3188

3189

3190

3191

3192

3193

3194

3195

3196

3197

3198

3199

3200

3201

3202

3203

3204

3205

3206

3207

3208

3209

3210

3211

3212

3213

3214

3215

3216

3217

3218

3219

3220

3221

3222

3223

3224

3225

3226

3227

3228

3229

3230

3231

3232

3233

3234

3235

3236

3237

3238

3239

3240

3241

3242

3243

3244

3245

3246

3247

3248

3249

3250

3251

3252

3253

3254

3255

3256

3257

3258

3259

3260

3261

3262

3263

3264

3265

3266

3267

3268

3269

3270

3271

3272

3273

3274

3275

3276

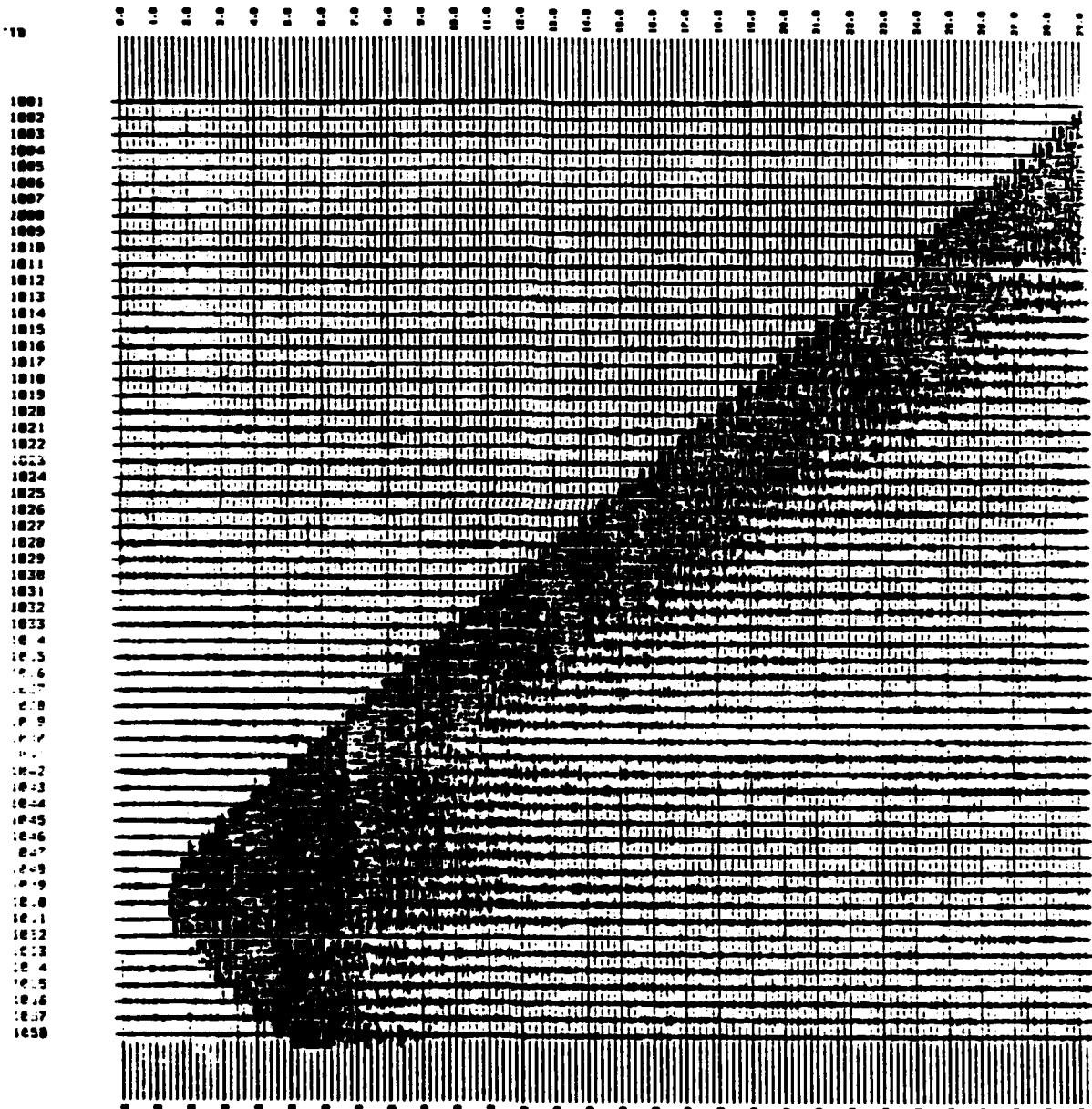
3277

3278

3279

3280

PROJECT : SICILY SICILY 21 0850 1 H2 (RNU DATA) LINE 1
 22-APR-1983 14:53:01.95 JOB NO. 8841
 POLARITY NORMAL - POSITIVE DATA(49997 MILES 07.344) PANEL NO. 1
 SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE REF. = 8.1877E+03

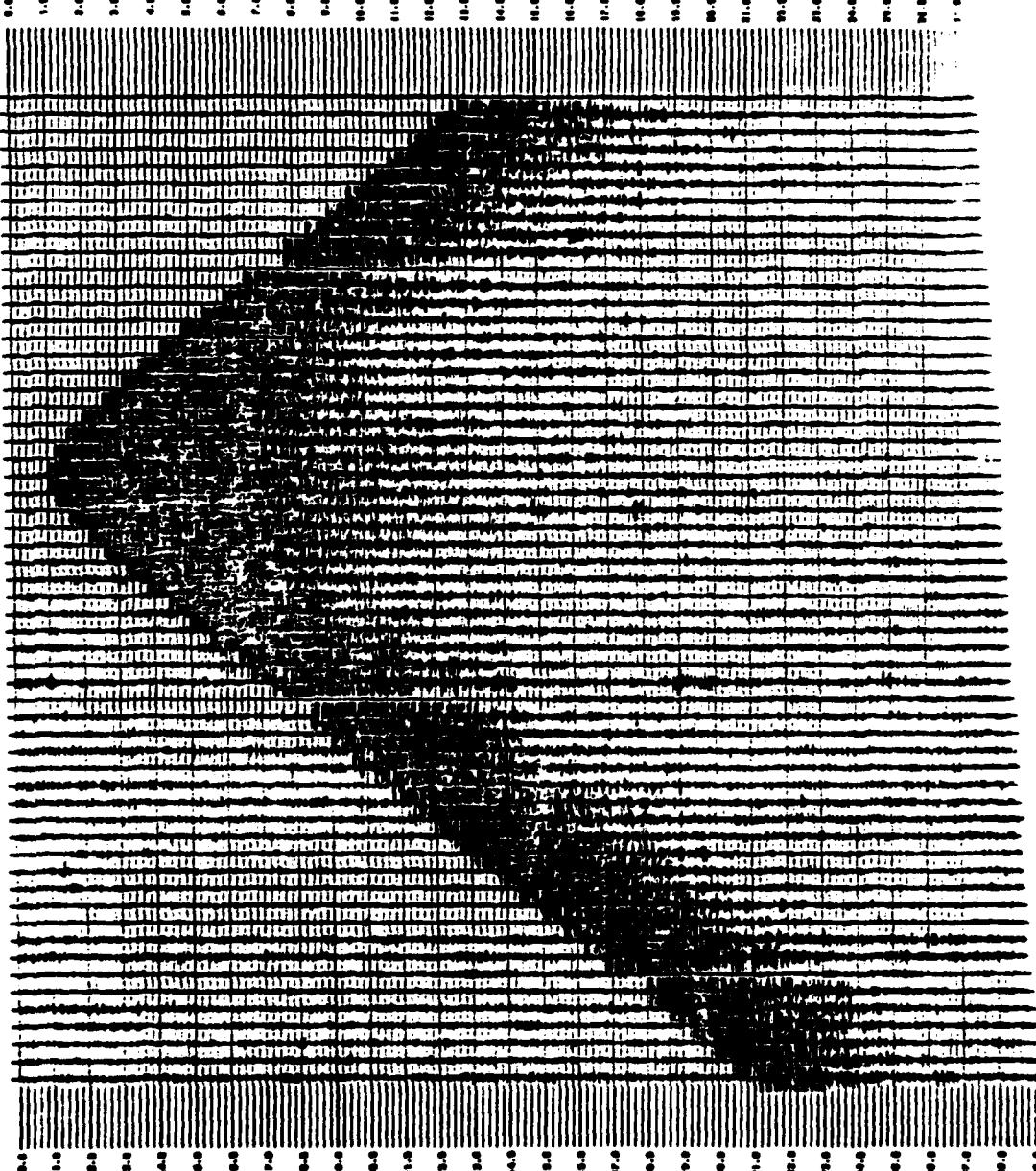


ED-84281	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9	5.0	5.1	5.2	5.3	5.4	5.5	5.6	5.7	5.8	5.9	6.0	6.1	6.2	6.3	6.4	6.5	6.6	6.7	6.8	6.9	7.0	7.1	7.2	7.3	7.4	7.5	7.6	7.7	7.8	7.9	8.0	8.1	8.2	8.3	8.4	8.5	8.6	8.7	8.8	8.9	9.0	9.1	9.2	9.3	9.4	9.5	9.6	9.7	9.8	9.9	10.0	10.1	10.2	10.3	10.4	10.5	10.6	10.7	10.8	10.9	11.0	11.1	11.2	11.3	11.4	11.5	11.6	11.7	11.8	11.9	12.0	12.1	12.2	12.3	12.4	12.5	12.6	12.7	12.8	12.9	13.0	13.1	13.2	13.3	13.4	13.5	13.6	13.7	13.8	13.9	14.0	14.1	14.2	14.3	14.4	14.5	14.6	14.7	14.8	14.9	15.0	15.1	15.2	15.3	15.4	15.5	15.6	15.7	15.8	15.9	16.0	16.1	16.2	16.3	16.4	16.5	16.6	16.7	16.8	16.9	17.0	17.1	17.2	17.3	17.4	17.5	17.6	17.7	17.8	17.9	18.0	18.1	18.2	18.3	18.4	18.5	18.6	18.7	18.8	18.9	19.0	19.1	19.2	19.3	19.4	19.5	19.6	19.7	19.8	19.9	20.0	20.1	20.2	20.3	20.4	20.5	20.6	20.7	20.8	20.9	21.0	21.1	21.2	21.3	21.4	21.5	21.6	21.7	21.8	21.9	22.0	22.1	22.2	22.3	22.4	22.5	22.6	22.7	22.8	22.9	23.0	23.1	23.2	23.3	23.4	23.5	23.6	23.7	23.8	23.9	24.0	24.1	24.2	24.3	24.4	24.5	24.6	24.7	24.8	24.9	25.0	25.1	25.2	25.3	25.4	25.5	25.6	25.7	25.8	25.9	26.0	26.1	26.2	26.3	26.4	26.5	26.6	26.7	26.8	26.9	27.0	27.1	27.2	27.3	27.4	27.5	27.6	27.7	27.8	27.9	28.0	28.1	28.2	28.3	28.4	28.5	28.6	28.7	28.8	28.9	29.0	29.1	29.2	29.3	29.4	29.5	29.6	29.7	29.8	29.9	30.0	30.1	30.2	30.3	30.4	30.5	30.6	30.7	30.8	30.9	31.0	31.1	31.2	31.3	31.4	31.5	31.6	31.7	31.8	31.9	32.0	32.1	32.2	32.3	32.4	32.5	32.6	32.7	32.8	32.9	33.0	33.1	33.2	33.3	33.4	33.5	33.6	33.7	33.8	33.9	34.0	34.1	34.2	34.3	34.4	34.5	34.6	34.7	34.8	34.9	35.0	35.1	35.2	35.3	35.4	35.5	35.6	35.7	35.8	35.9	36.0	36.1	36.2	36.3	36.4	36.5	36.6	36.7	36.8	36.9	37.0	37.1	37.2	37.3	37.4	37.5	37.6	37.7	37.8	37.9	38.0	38.1	38.2	38.3	38.4	38.5	38.6	38.7	38.8	38.9	39.0	39.1	39.2	39.3	39.4	39.5	39.6	39.7	39.8	39.9	40.0	40.1	40.2	40.3	40.4	40.5	40.6	40.7	40.8	40.9	41.0	41.1	41.2	41.3	41.4	41.5	41.6	41.7	41.8	41.9	42.0	42.1	42.2	42.3	42.4	42.5	42.6	42.7	42.8	42.9	43.0	43.1	43.2	43.3	43.4	43.5	43.6	43.7	43.8	43.9	44.0	44.1	44.2	44.3	44.4	44.5	44.6	44.7	44.8	44.9	45.0	45.1	45.2	45.3	45.4	45.5	45.6	45.7	45.8	45.9	46.0	46.1	46.2	46.3	46.4	46.5	46.6	46.7	46.8	46.9	47.0	47.1	47.2	47.3	47.4	47.5	47.6	47.7	47.8	47.9	48.0	48.1	48.2	48.3	48.4	48.5	48.6	48.7	48.8	48.9	49.0	49.1	49.2	49.3	49.4	49.5	49.6	49.7	49.8	49.9	50.0	50.1	50.2	50.3	50.4	50.5	50.6	50.7	50.8	50.9	51.0	51.1	51.2	51.3	51.4	51.5	51.6	51.7	51.8	51.9	52.0	52.1	52.2	52.3	52.4	52.5	52.6	52.7	52.8	52.9	53.0	53.1	53.2	53.3	53.4	53.5	53.6	53.7	53.8	53.9	54.0	54.1	54.2	54.3	54.4	54.5	54.6	54.7	54.8	54.9	55.0	55.1	55.2	55.3	55.4	55.5	55.6	55.7	55.8	55.9	56.0	56.1	56.2	56.3	56.4	56.5	56.6	56.7	56.8	56.9	57.0	57.1	57.2	57.3	57.4	57.5	57.6	57.7	57.8	57.9	58.0	58.1	58.2	58.3	58.4	58.5	58.6	58.7	58.8	58.9	59.0	59.1	59.2	59.3	59.4	59.5	59.6	59.7	59.8	59.9	60.0	60.1	60.2	60.3	60.4	60.5	60.6	60.7	60.8	60.9	61.0	61.1	61.2	61.3	61.4	61.5	61.6	61.7	61.8	61.9	62.0	62.1	62.2	62.3	62.4	62.5	62.6	62.7	62.8	62.9	63.0	63.1	63.2	63.3	63.4	63.5	63.6	63.7	63.8	63.9	64.0	64.1	64.2	64.3	64.4	64.5	64.6	64.7	64.8	64.9	65.0	65.1	65.2	65.3	65.4	65.5	65.6	65.7	65.8	65.9	66.0	66.1	66.2	66.3	66.4	66.5	66.6	66.7	66.8	66.9	67.0	67.1	67.2	67.3	67.4	67.5	67.6	67.7	67.8	67.9	68.0	68.1	68.2	68.3	68.4	68.5	68.6	68.7	68.8	68.9	69.0	69.1	69.2	69.3	69.4	69.5	69.6	69.7	69.8	69.9	70.0	70.1	70.2	70.3	70.4	70.5	70.6	70.7	70.8	70.9	71.0	71.1	71.2	71.3	71.4	71.5	71.6	71.7	71.8	71.9	72.0	72.1	72.2	72.3	72.4	72.5	72.6	72.7	72.8	72.9	73.0	73.1	73.2	73.3	73.4	73.5	73.6	73.7	73.8	73.9	74.0	74.1	74.2	74.3	74.4	74.5	74.6	74.7	74.8	74.9	75.0	75.1	75.2	75.3	75.4	75.5	75.6	75.7	75.8	75.9	76.0	76.1	76.2	76.3	76.4	76.5	76.6	76.7	76.8	76.9	77.0	77.1	77.2	77.3	77.4	77.5	77.6	77.7	77.8	77.9	78.0	78.1	78.2	78.3	78.4	78.5	78.6	78.7	78.8	78.9	79.0	79.1	79.2	79.3	79.4	79.5	79.6	79.7	79.8	79.9	80.0	80.1	80.2	80.3	80.4	80.5	80.6	80.7	80.8	80.9	81.0	81.1	81.2	81.3	81.4	81.5	81.6	81.7	81.8	81.9	82.0	82.1	82.2	82.3	82.4	82.5	82.6	82.7	82.8	82.9	83.0	83.1	83.2	83.3	83.4	83.5	83.6	83.7	83.8	83.9	84.0	84.1	84.2	84.3	84.4	84.5	84.6	84.7	84.8	84.9	85.0	85.1	85.2	85.3	85.4	85.5	85.6	85.7	85.8	85.9	86.0	86.1	86.2	86.3	86.4	86.5	86.6	86.7	86.8	86.9	87.0	87.1	87.2	87.3	87.4	87.5	87.6	87.7	87.8	87.9	88.0	88.1	88.2	88.3	88.4	88.5	88.6	88.7	88.8	88.9	89.0	89.1	89.2	89.3	89.4	89.5	89.6	89.7	89.8	89.9	90.0	90.1	90.2	90.3	90.4	90.5	90.6	90.7	90.8	90.9	91.0	91.1	91.2	91.3	91.4	91.5	91.6	91.7	91.8	91.9	92.0	92.1	92.2	92.3	92.4	92.5	92.6	92.7	92.8	92.9	93.0	93.1	93.2	93.3	93.4	93.5	93.6	93.7	93.8	93.9	94.0	94.1	94.2	94.3	94.4	94.5	94.6	94.7	94.8	94.9	95.0	95.1	95.2	95.3	95.4	95.5	95.6	95.7	95.8	95.9	96.0	96.1	96.2	96.3	96.4	96.5	96.6	96.7	96.8	96.9	97.0	97.1	97.2	97.3	97.4	97.5	97.6	97.7	97.8	97.9	98.0	98.1	98.2	98.3	98.4	98.5	98.6	98.7	98.8	98.9	99.0	99.1	99.2	99.3	99.4	99.5	99.6	99.7	99.8	99.9	100.0
----------	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	-------

PROJECT : SICILY SICILY 21 0880 2 H2 (RAU DATA) LINE 1
 22-MAR-1982 14:55:36.98 JOB NO. 8842
 POLARITY NORMAL - POSITIVE DATA(40997 MILLS 07.344) PANEL NO. 1
 SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE REF. = 8.3831E+03

PP10

2881
 2882
 2883
 2884
 2885
 2886
 2887
 2888
 2889
 2890
 2891
 2892
 2893
 2894
 2895
 2896
 2897
 2898
 2899
 2900
 2901
 2902
 2903
 2904
 2905
 2906
 2907
 2908
 2909
 2910
 2911
 2912
 2913
 2914
 2915
 2916
 2917
 2918
 2919
 2920
 2921
 2922
 2923
 2924
 2925
 2926
 2927
 2928
 2929
 2930
 2931
 2932
 2933
 2934
 2935
 2936
 2937
 2938
 2939
 2940
 2941
 2942
 2943
 2944
 2945
 2946
 2947
 2948
 2949
 2950
 2951
 2952
 2953
 2954
 2955
 2956
 2957
 2958

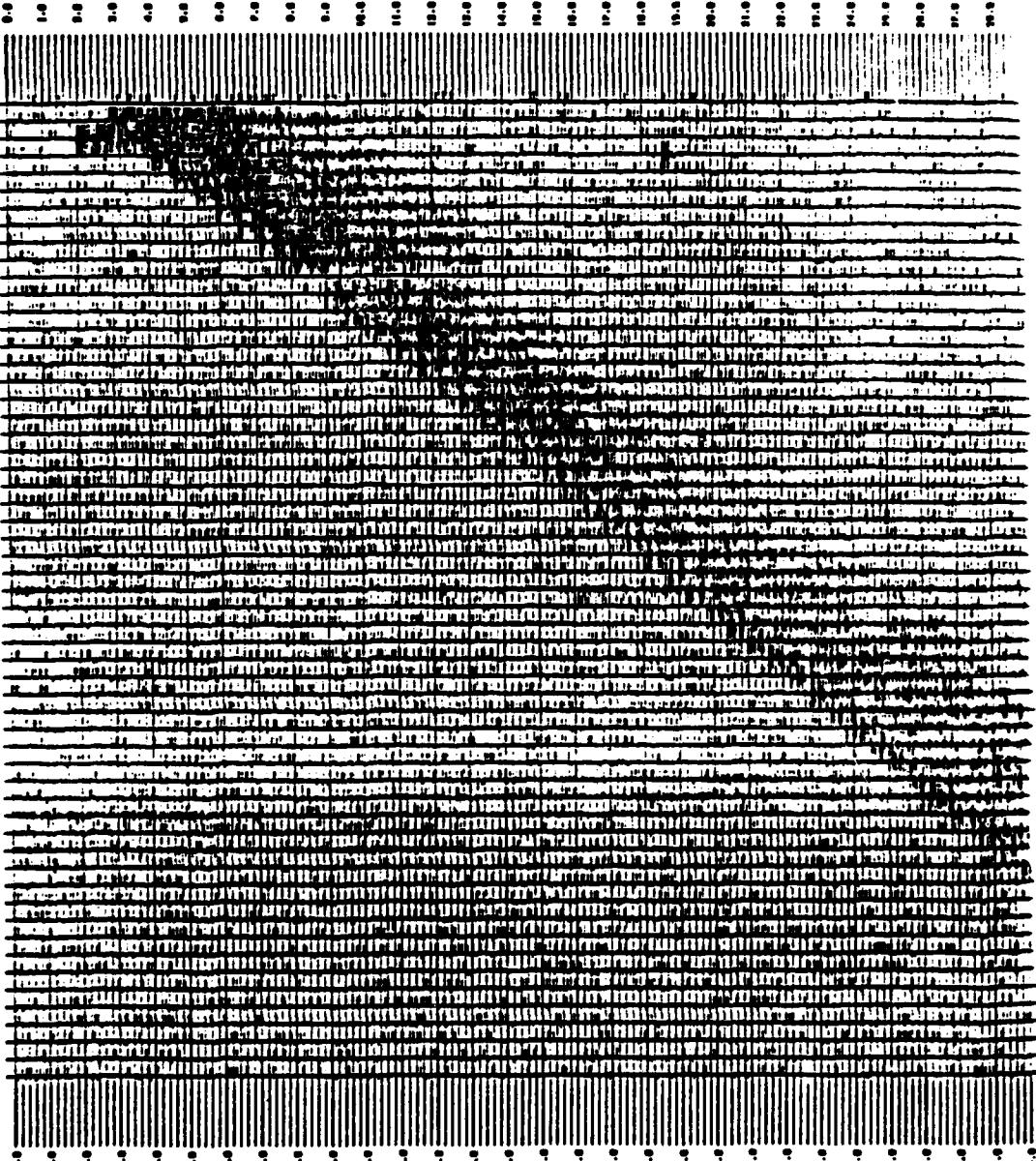


PROJECT : SICILY	SICILY 21 0880 2	H2	(RAU DATA)	LINE 1
POLARITY NORMAL - POSITIVE	DATA(40997 MILLS 07.344)	JOB NO.	8842	
SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE	REF. = 8.3831E+03	PANEL NO.	1	
22-MAR-1982 14:55:36.98				

PROJECT : SICILY SICILY 21 OBS-3 (RAW DATA) LINE : 1
 22-APR-1983 14:57:58.27 JOB NO. 3843
 POLARITY NORMAL - POSITIVE DATA(49997 MILLS 07.344) PANEL NO. 1
 SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE REF. = 0.9848E+03

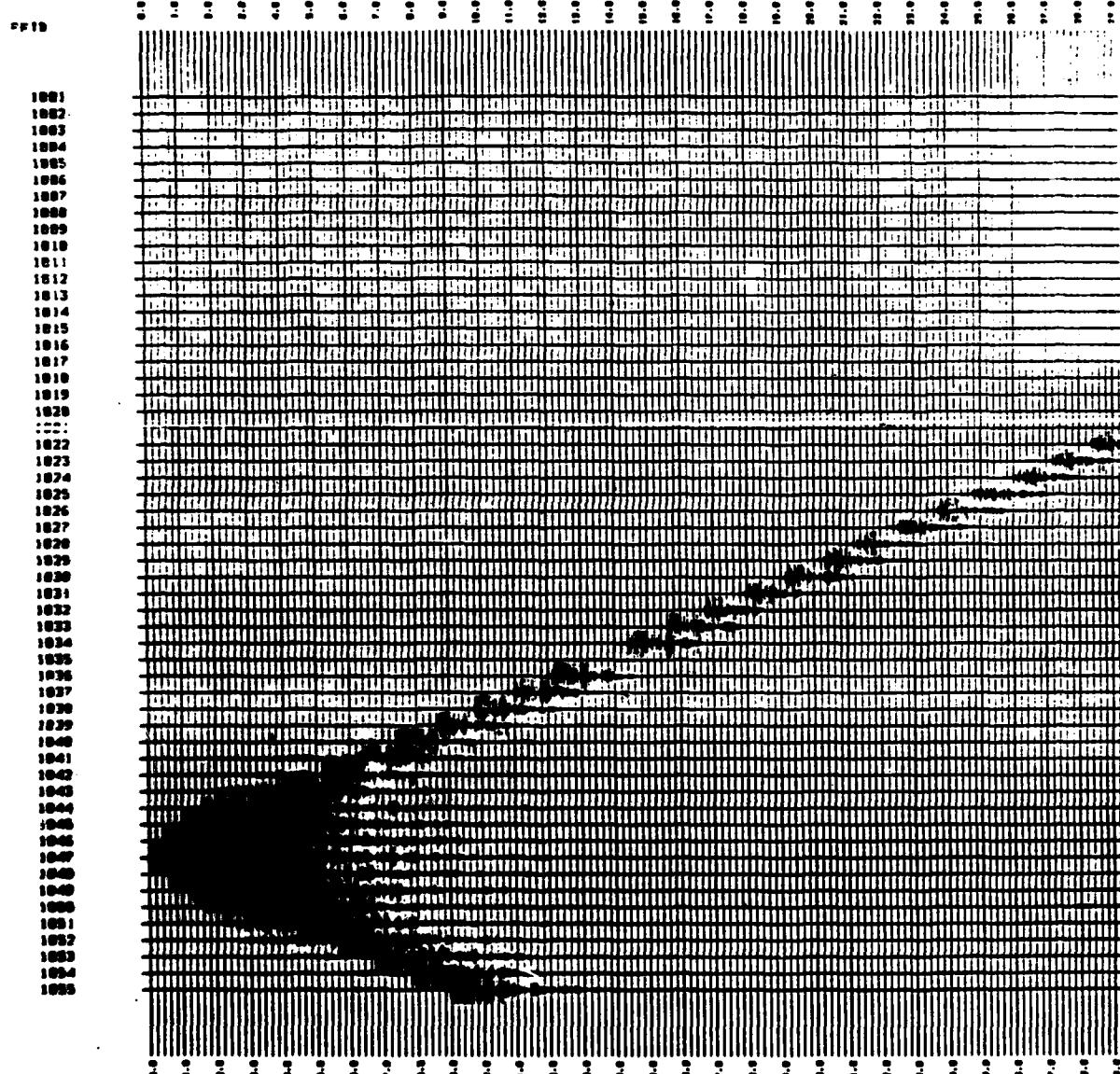
FFID

3801
 3802
 3803
 3804
 3805
 3806
 3807
 3808
 3809
 3810
 3811
 3812
 3813
 3814
 3815
 3816
 3817
 3818
 3819
 3820
 3821
 3822
 3823
 3824
 3825
 3826
 3827
 3828
 3829
 3830
 3831
 3832
 3833
 3834
 3835
 3836
 3837
 3838
 3839
 3840
 3841
 3842
 3843
 3844
 3845
 3846
 3847
 3848
 3849
 3850
 3851
 3852
 3853
 3854
 3855
 3856
 3857
 3858



PROJECT : SICILY	SICILY 21 OBS-3	(RAW DATA)	LINE : 1
POLARITY NORMAL - POSITIVE	DATA(49997 MILLS 07.344)	PANEL NO. 1	REF. = 0.9848E+03
SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE			
22-APR-1983 14:57:58.27	JOB NO. 3843		
00-00000000000000000000000000000000			

PROJECT : SICILY SICILY 22 DB50 I VERTICAL (IRAU DATA) LINE 2
 22-APR-1983 09:02:41.39 JOB NO. 7528
 POLARITY NORMAL - POSITIVE DATUM(59993 MILLS 07.344) PANEL NO. 1
 SECOND AVERAGE USING 4 WINDOOS OVER ENTIRE TRACE REF. = 0.1015E+04



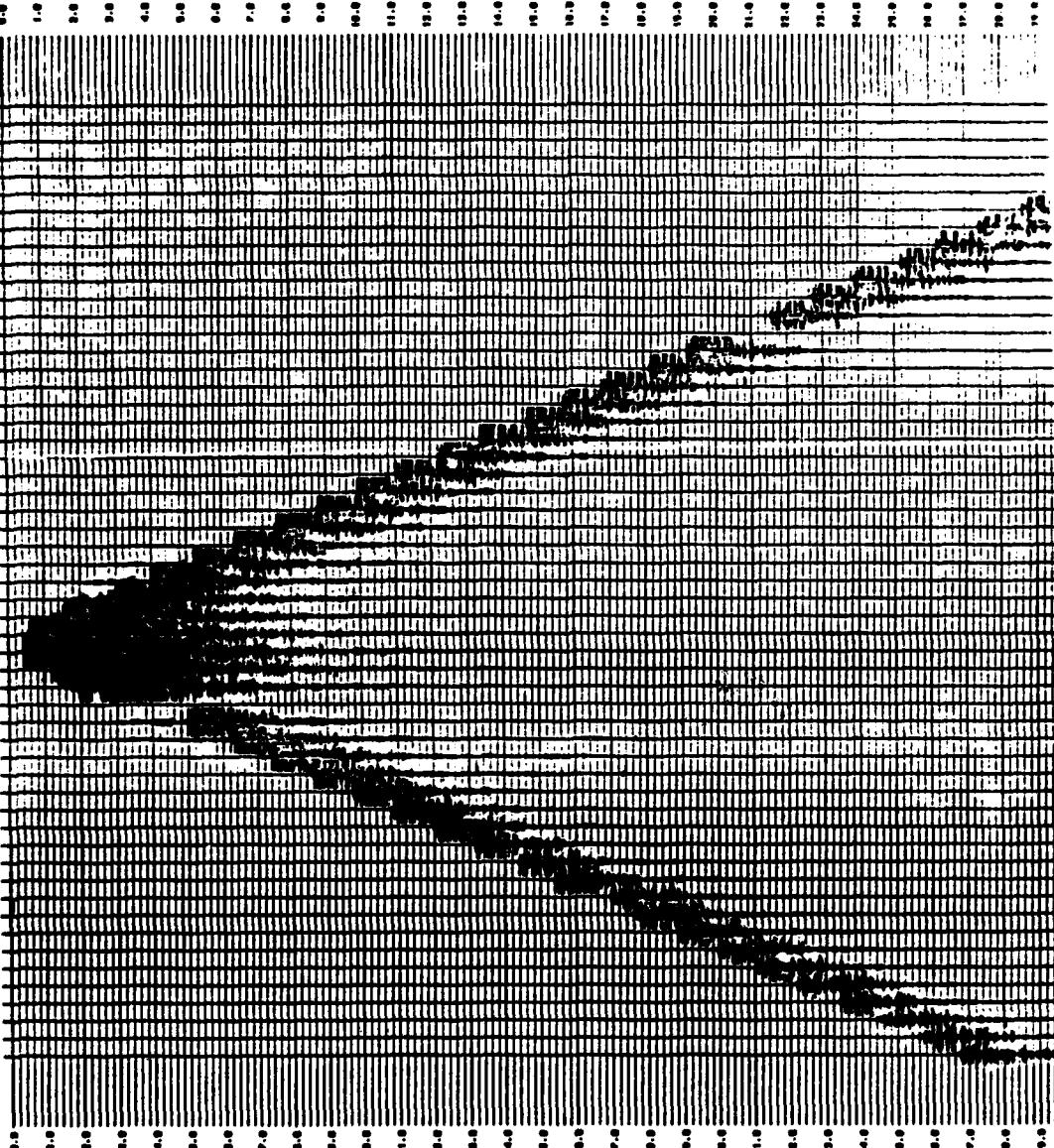
PROJECT : SICILY SICILY 22 DB50 I VERTICAL (IRAU DATA) LINE 2
 22-APR-1983 09:02:41.39 JOB NO. 7528
 POLARITY NORMAL - POSITIVE DATUM(59993 MILLS 07.344) PANEL NO. 1
 SECOND AVERAGE USING 4 WINDOOS OVER ENTIRE TRACE REF. = 0.1015E+04

PROJECT : SICILY SICILY 22 OBS+ 2 VERTICAL (RAW DATA)
22-APR-1983 09105158.94
POLARITY NORMAL - POSITIVE DATA(59993 MILLS 07.344)

LINE 2 LINE 2
JOB NO. 7930 JOB NO. 7930
PANEL NO. 1 PANEL NO. 1
REF. = B.1310E+04

FFID

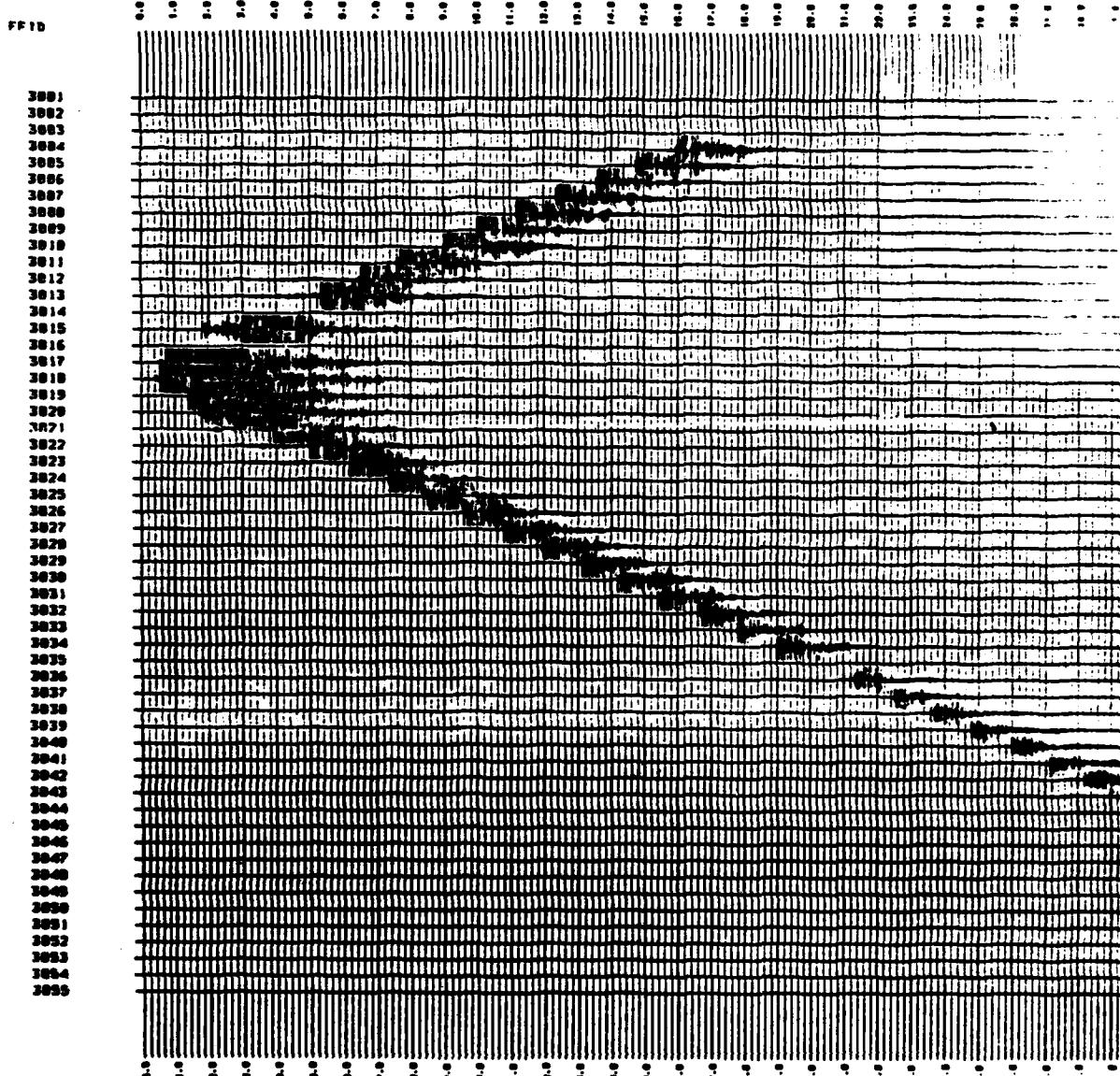
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
2027
2028
2029
2030
2031
2032
2033
2034
2035
2036
2037
2038
2039
2040
2041
2042
2043
2044
2045
2046
2047
2048
2049
2050
2051
2052
2053
2054
2055



PROJECT : SICILY SICILY 22 OBS+ 2 VERTICAL (RAW DATA)
22-APR-1983 09105158.94
POLARITY NORMAL - POSITIVE DATA(59993 MILLS 07.344)

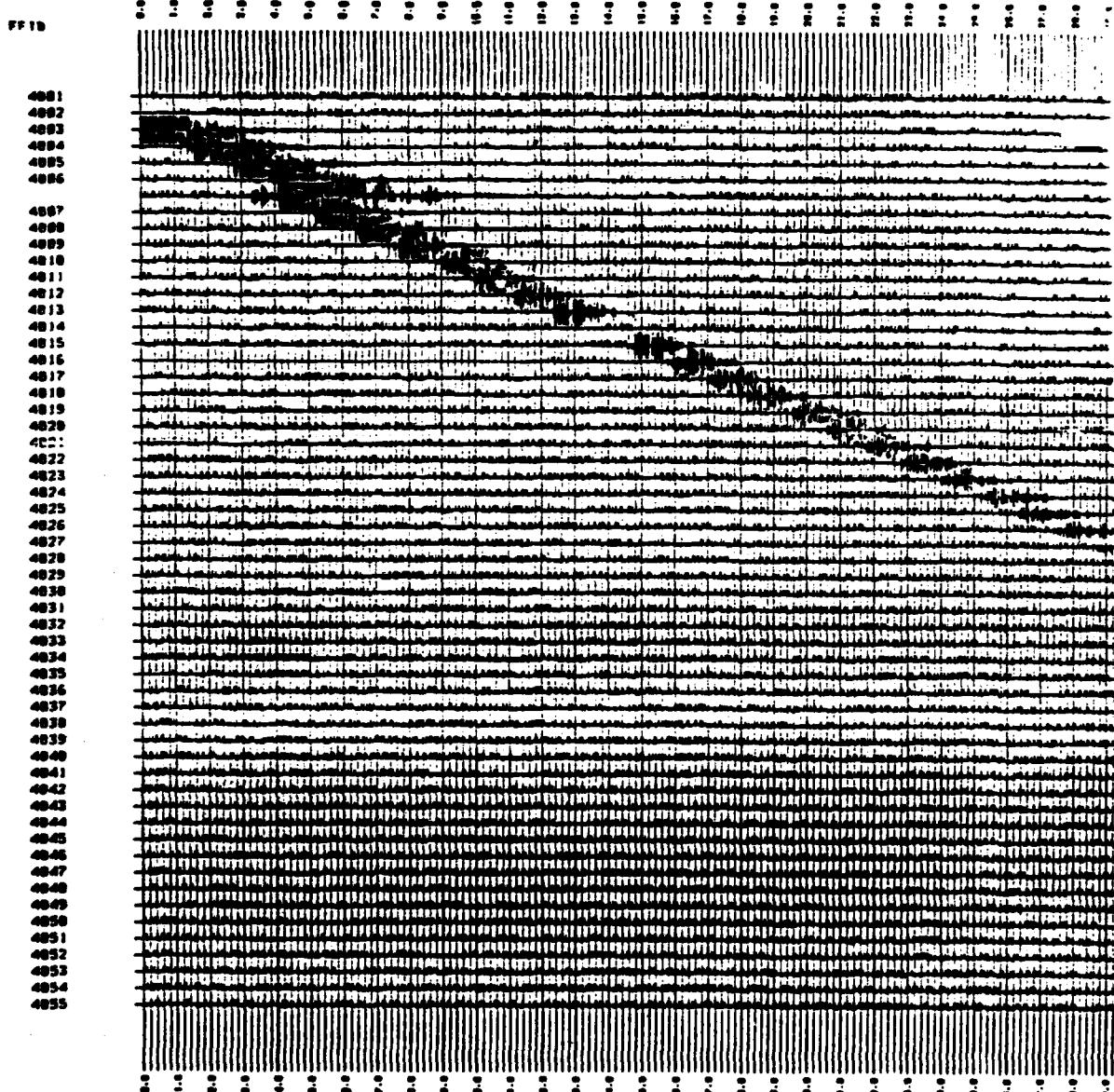
SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE
REF. = B.1310E+04
LINE 2 LINE 2
JOB NO. 7930 JOB NO. 7930
PANEL NO. 1 PANEL NO. 1

PROJECT : SICILY SICILY 22 0050 3 VERTICAL (RAW DATA) LINE 2
 22-APR-1983 09:00:39.40 JOB NO. 7932
 POLARITY NORMAL - POSITIVE DATA(59993 MILLS 07.344) PANEL NO. 1
 SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE REF. = 0.5551E+03



PROJECT : SICILY SICILY 22 0050 3 VERTICAL (RAW DATA)	LINE 2
POLARITY NORMAL - POSITIVE DATA(59993 MILLS 07.344)	JOB NO. 7932
SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE	PANEL NO. 1
REF. = 0.5551E+03	

PROJECT : SICILY	SICILY 22 0890 4 VERTICAL (RAU DATA)	LINE 2
	22-MP-1983 09:12:09.66	JOB NO. 7933
POLARITY NORMAL - POSITIVE	NETRAC 39993 MILLS 07.344	PANEL NO. 1
SECOND AVERAGE USING 4 WIMBLES OVER ENTIRE TRACE	REF. = B.1604E+04	

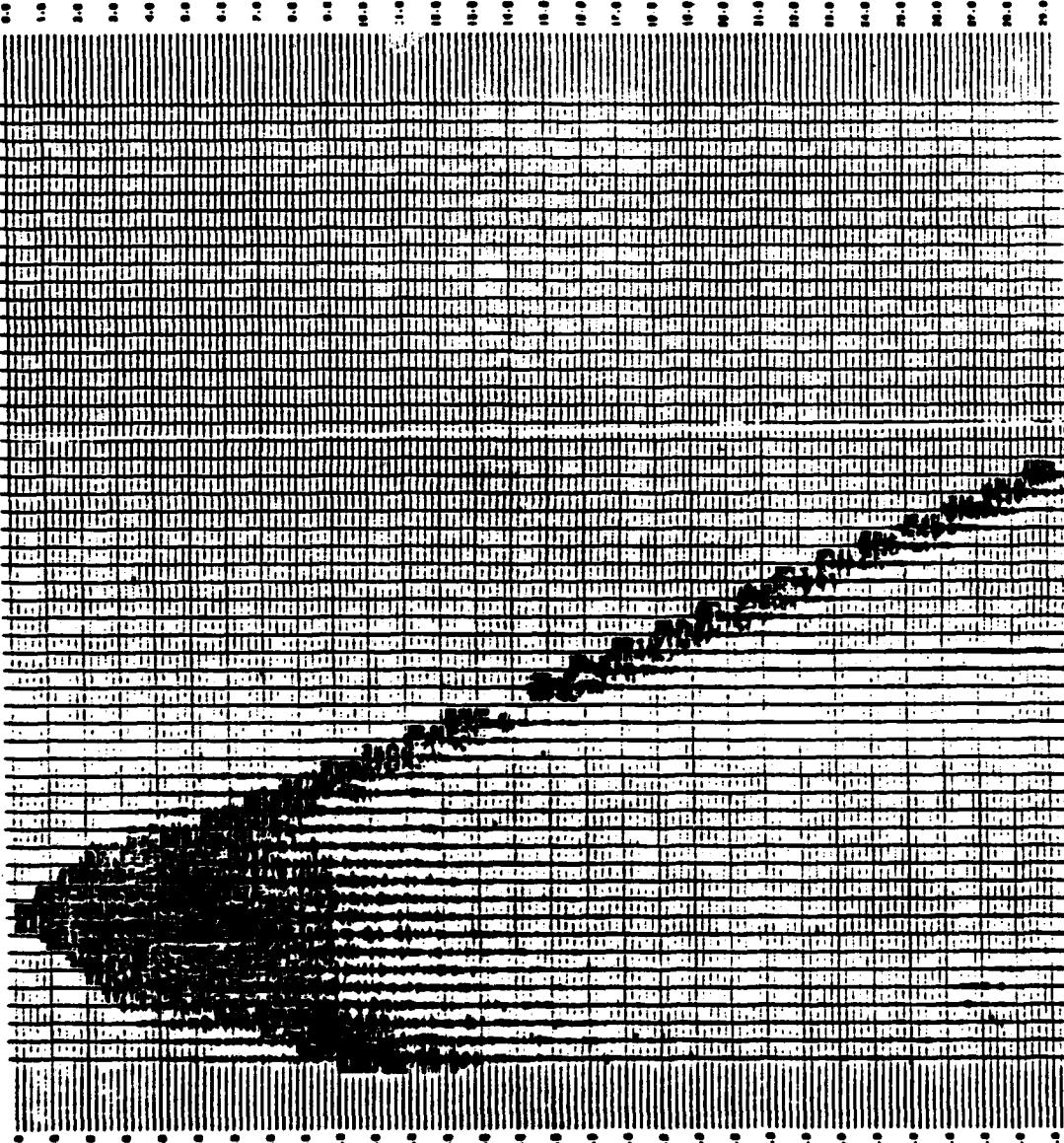


PROJECT : SICILY	SICILY 22 0890 4 VERTICAL (RAU DATA)	LINE 2
	22-MP-1983 09:12:09.66	JOB NO. 7933
POLARITY NORMAL - POSITIVE	NETRAC 39993 MILLS 07.344	PANEL NO. 1
SECOND AVERAGE USING 4 WIMBLES OVER ENTIRE TRACE	REF. = B.1604E+04	

PROJECT : SICILY SICILY 22 0050 1 H1 (BNU DATA) LINE 2
 22-APR-1963 09:15:46.72 JOB NO. 7934
 POLARITY NORMAL - POSITIVE DATA(55593 MILES 07.346) PANEL NO. 1
 SECOND AVERAGE USING 4 WINDINGS OVER ENTIRE TRACE REF. = 0.1552E+04

TP10

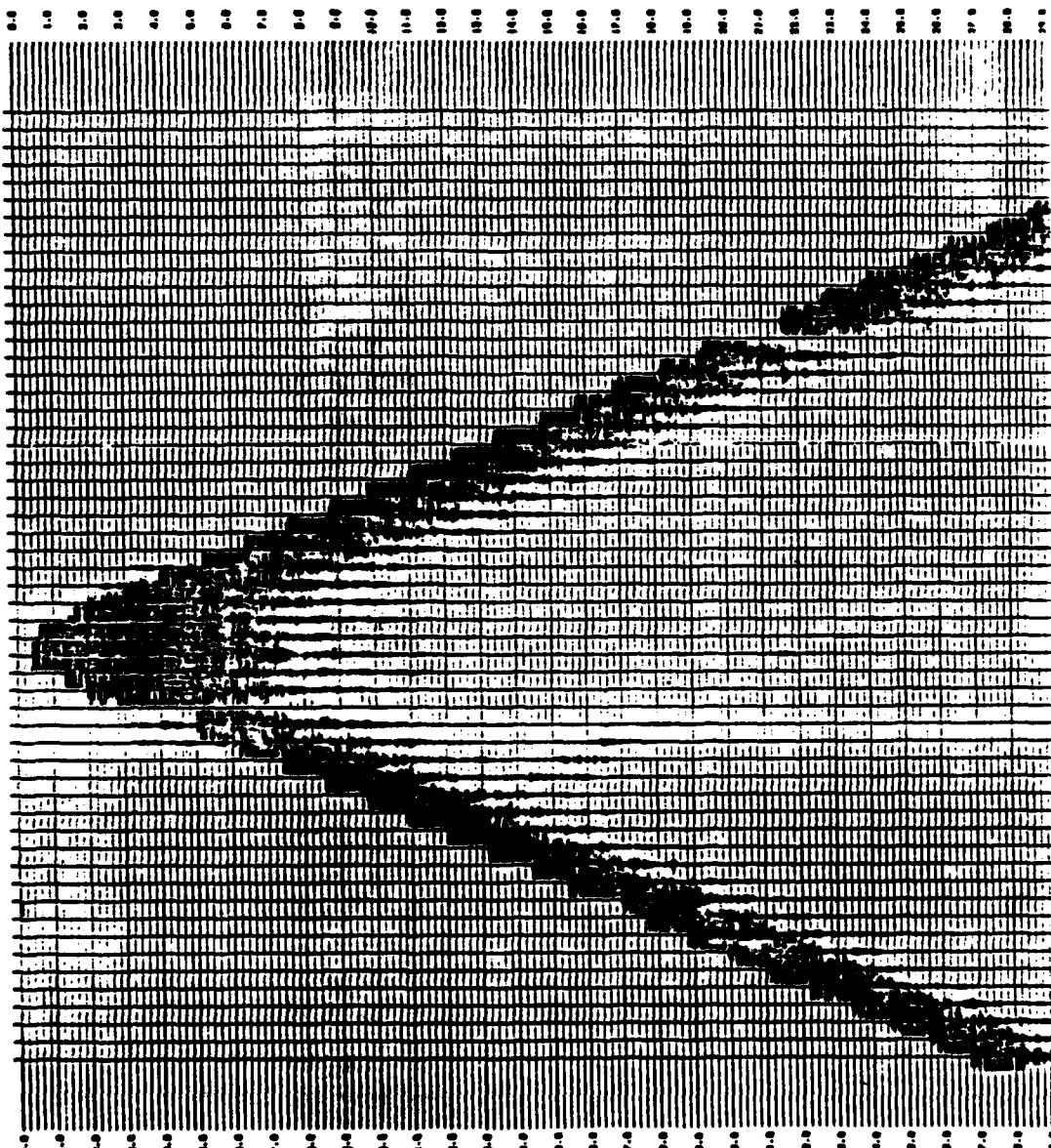
1001
 1002
 1003
 1004
 1005
 1006
 1007
 1008
 1009
 1010
 1011
 1012
 1013
 1014
 1015
 1016
 1017
 1018
 1019
 1020
 1021
 1022
 1023
 1024
 1025
 1026
 1027
 1028
 1029
 1030
 1031
 1032
 1033
 1034
 1035
 1036
 1037
 1038
 1039
 1040
 1041
 1042
 1043
 1044
 1045
 1046
 1047
 1048
 1049
 1050
 1051
 1052
 1053
 1054
 1055



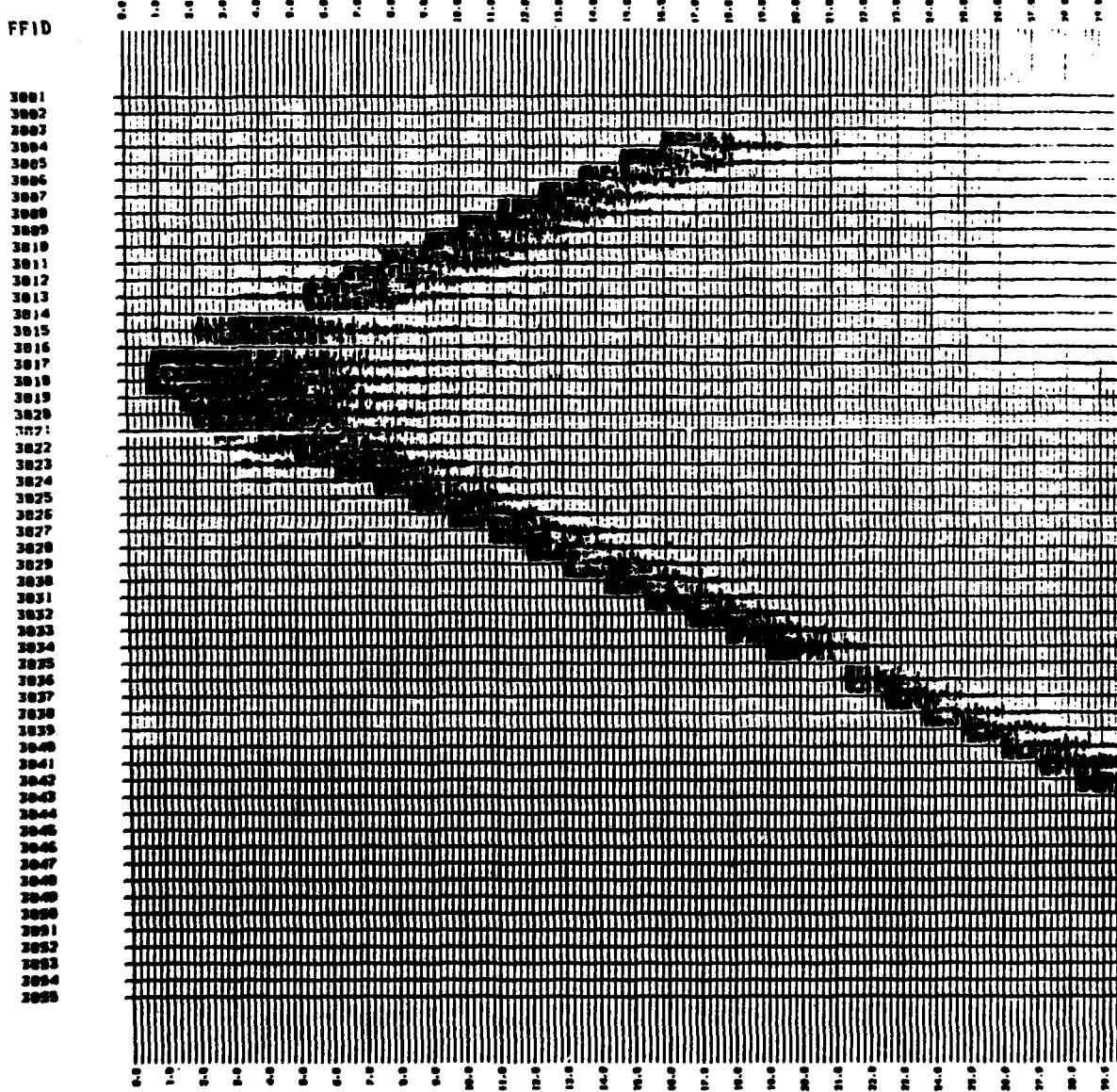
PROJECT : SICILY SICILY 22 0050 1 H1 (BNU DATA)	LINE 2
POLARITY NORMAL - POSITIVE DATA(55593 MILES 07.346)	PANEL NO. 1
SECOND AVERAGE USING 4 WINDINGS OVER ENTIRE TRACE	REF. = 0.1552E+04
22-APR-1963 09:15:46.72	JOB NO. 7934

PROJECT : SICILY SICILY ZZ 0850 2 H1 (RHO BATH) LINE 2
22-APR-1963 09:18:17-16 JOB NO. 7935
POLARITY NORMAL - POSITIVE BATH(9993) MILLS DP.3441 PANEL NO. 1
SECOND AVERAGE USING 4 WINBORG DIVER TRACE REF. - 8.3991E+84

2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
- - -
2021
2022
2023
2024
2025
2026
2027
2028
2029
2030
2031
2032
2033
2034
2035
2036
2037
2038
2039
2040
2041
2042
2043
2044
2045
2046
2047
2048
2049
2050
2051
2052
2053
2054
2055

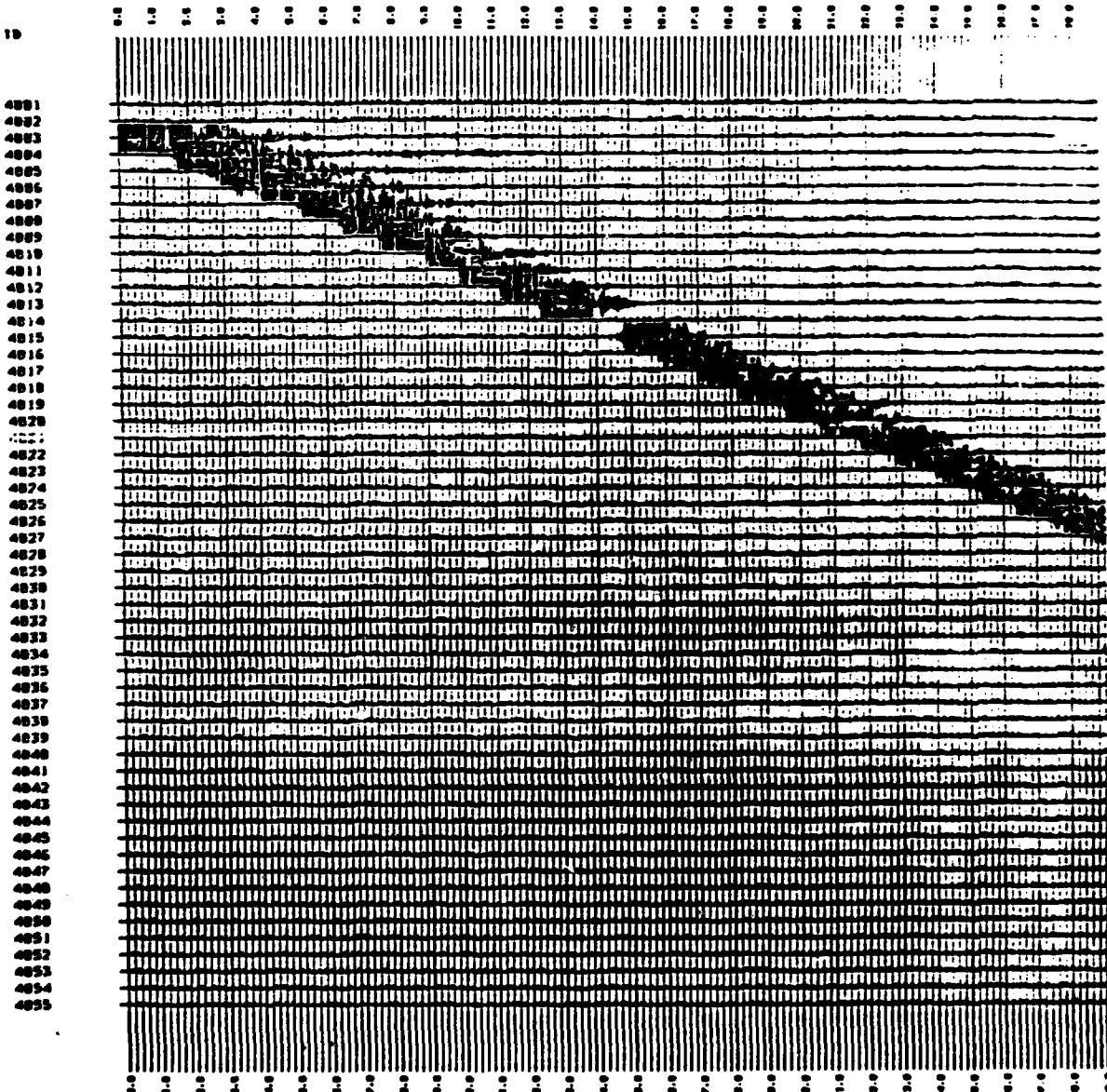


PROJECT : SICILY SICILY 22 OBS 3 HI (RAW DATA) LINE 2
 22-APR-1983 09:28:51.02 JOB NO. 7936
 POLARITY NORMAL - POSITIVE DATA(59993 MILS 07.344) PANEL NO. 1
 SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE REF. = 0.2886E+04



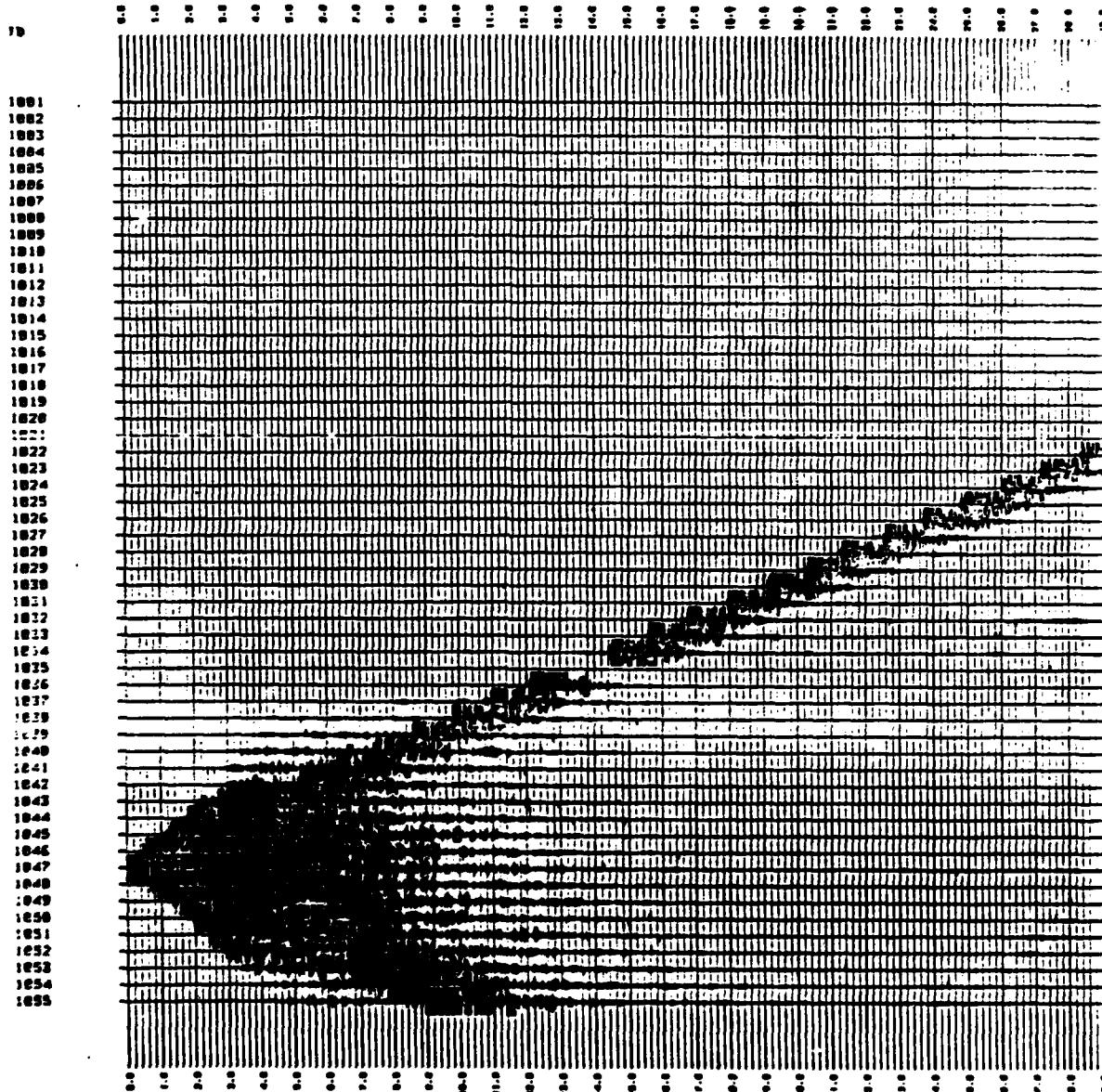
PROJECT : SICILY SICILY 22 OBS 3 HI (RAW DATA)	LINE 2
22-APR-1983 09:28:51.02	JOB NO. 7936
POLARITY NORMAL - POSITIVE DATA(59993 MILS 07.344)	PANEL NO. 1
SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE	REF. = 0.2886E+04

PROJECT : SICILY SICILY 22 OBS 4 H1 (RAU DATA) LINE 2
 22-APR-1983 09:23:47.05 JOB NO. 7938
 POLARITY NORMAL - POSITIVE DATA(S9993 MILLS 07.344) PANEL NO. 1
 SECOND AVERAGE USING 4 WINDOW OVER ENTIRE TRACE REF. = B-2873E+04



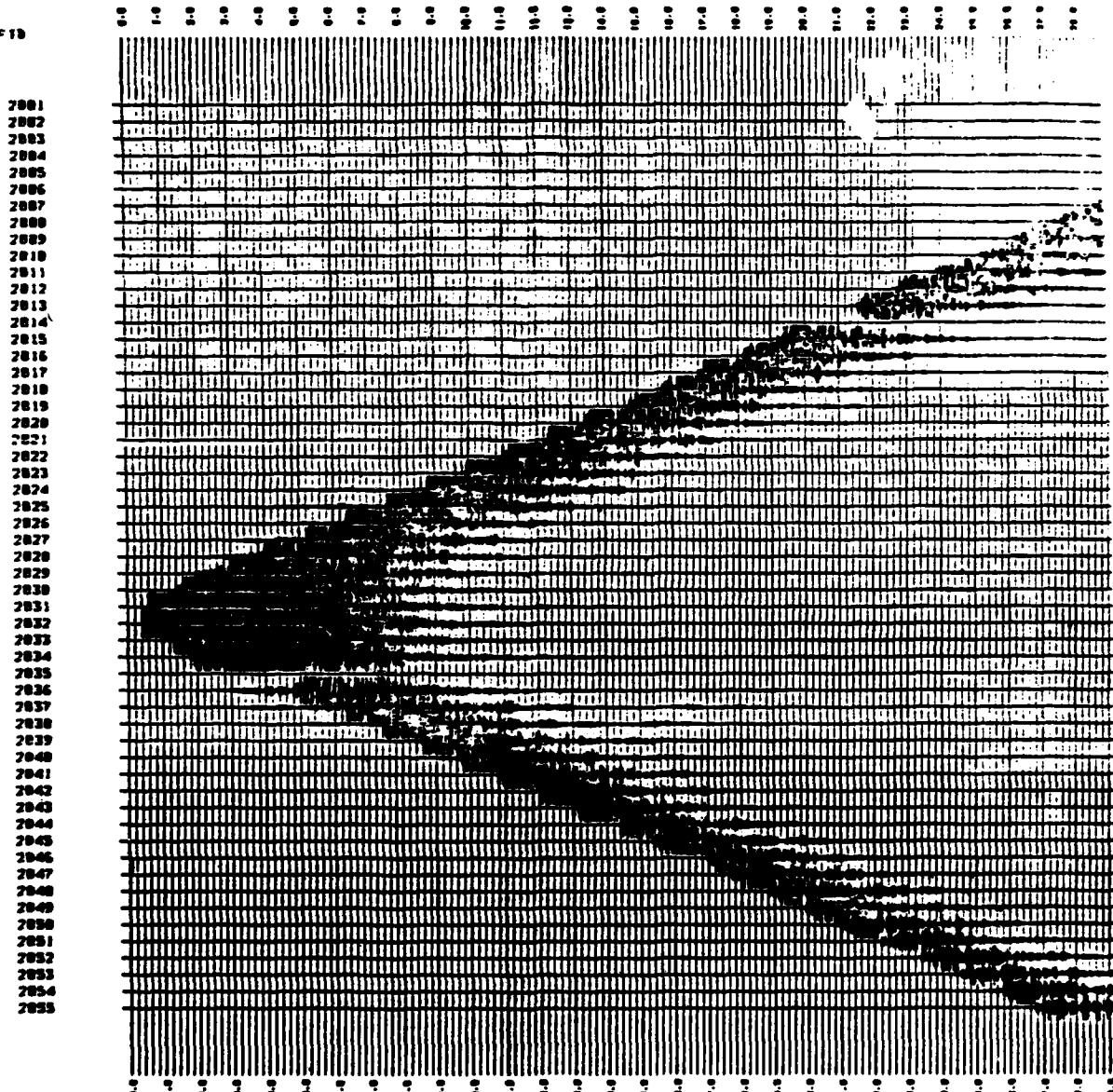
PROJECT : SICILY SICILY 22 OBS 4 H1 (RAU DATA) LINE 2
 22-APR-1983 09:23:47.05 JOB NO. 7938
 POLARITY NORMAL - POSITIVE DATA(S9993 MILLS 07.344) PANEL NO. 1
 SECOND AVERAGE USING 4 WINDOW OVER ENTIRE TRACE REF. = B-2873E+04

PROJECT : SICILY SICILY 22 0850 1 . . H2 . (RNU DATA) LINE 2
 22-APR-1983 09:27:18.59 JOB NO. 7540
 POLARITY NORMAL - POSITIVE DATA(59993 MILLS 07.344) PNL NO. 1
 SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE REF. - 0.18146-04



PROJECT : SICILY SICILY 22 0850 1 H2 . (RNU DATA) LINE 2
 22-APR-1983 09:27:18.59 JOB NO. 7540
 POLARITY NORMAL - POSITIVE DATA(59993 MILLS 07.344) PNL NO. 1
 SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE REF. - 0.18146-04

PROJECT : SICILY SICILY 22 OBS+2 HZ (RAW DATA) LINE 2
 22-APR-1983 09:29:38.54 JOB NO. 7941
 POLARITY NORMAL - POSITIVE DATA(35993 MILS 07.344) PANEL NO. 1
 SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE REF. = 0.2474E+04

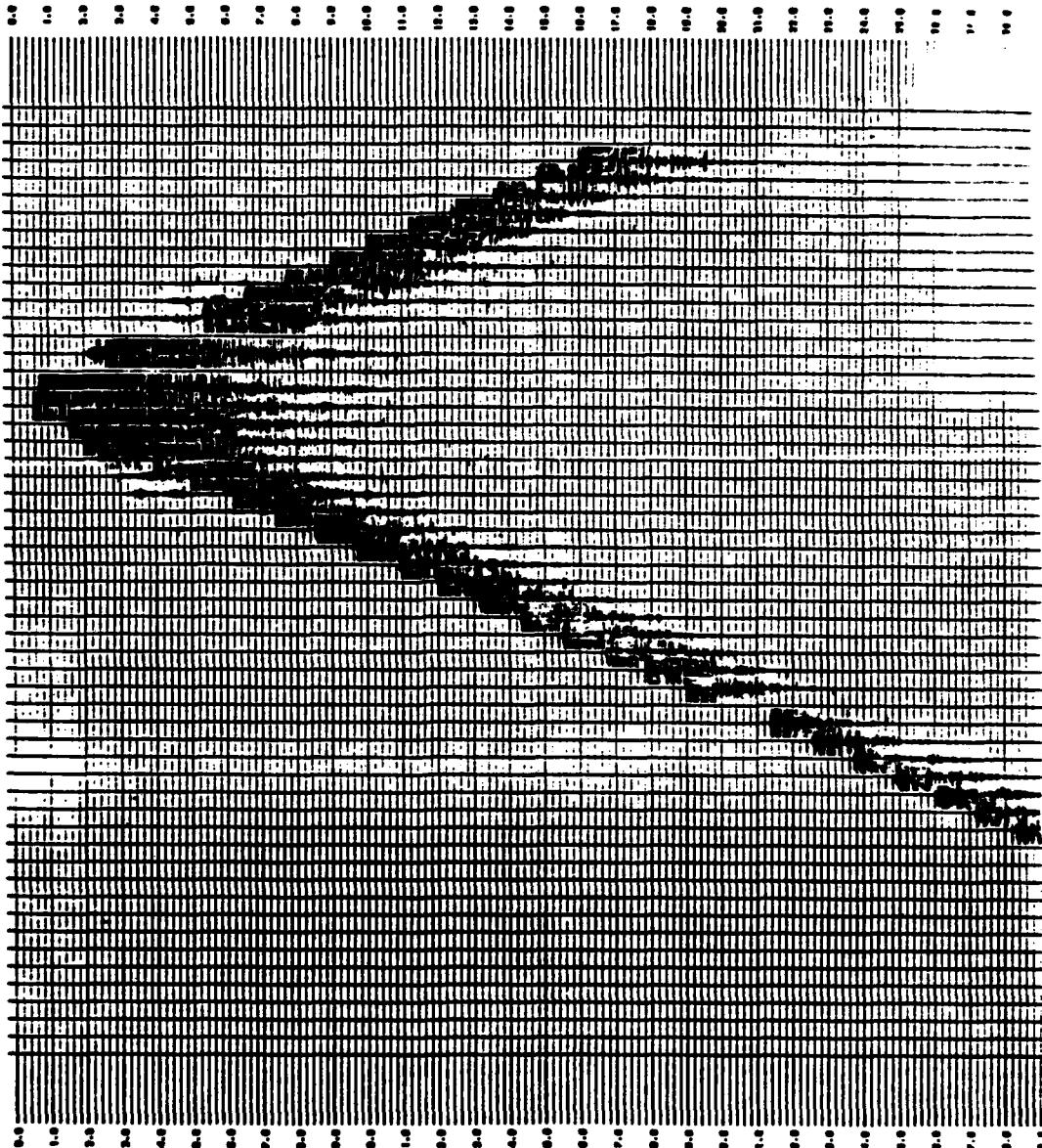


PROJECT : SICILY SICILY 22 OBS+2 HZ (RAW DATA) LINE 2
 22-APR-1983 09:29:38.54 JOB NO. 7941
 POLARITY NORMAL - POSITIVE DATA(35993 MILS 07.344) PANEL NO. 1
 SECONDS AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE REF. = 0.2474E+04

PROJECT : SICILY SICILY 22 OBS 3 H2 (RNU DATA) LINE 2
22-APR-1983 09:32:19.96 JOB NO. 7943
POLARITY NORMAL - POSITIVE DATA(59993 MILS 07.344) PANEL NO. 1
SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE REF. = B.1663E+04

FFTB

3001
3002
3003
3004
3005
3006
3007
3008
3009
3010
3011
3012
3013
3014
3015
3016
3017
3018
3019
3020
3021
3022
3023
3024
3025
3026
3027
3028
3029
3030
3031
3032
3033
3034
3035
3036
3037
3038
3039
3040
3041
3042
3043
3044
3045
3046
3047
3048
3049
3050
3051
3052
3053
3054
3055



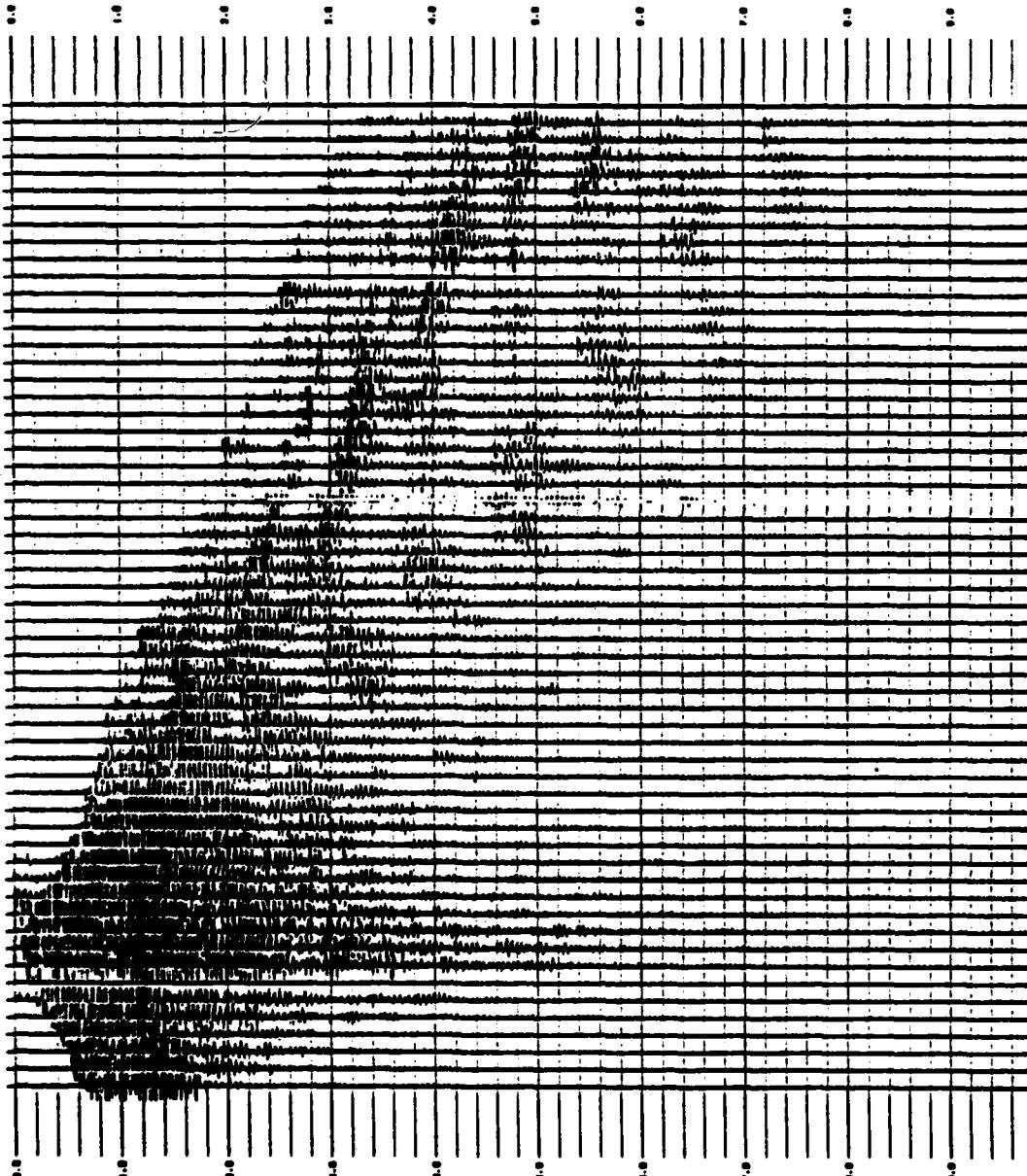
PROJECT : SICILY SICILY 22 OBS 3 H2 (RNU DATA) LINE 2
22-APR-1983 09:32:19.96 JOB NO. 7943
POLARITY NORMAL - POSITIVE DATA(59993 MILS 07.344) PANEL NO. 1
SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE REF. = B.1663E+04

PROJECT : SICILY SICILY 22 085° 4 H2 (RAW DATA) LINE 2
 22-APR-1963 99:35:19.00 JOB NO. 7540
 POLARITY NORMAL - POSITIVE DATA(55993 MILLS 87.344) PANEL NO. 1
 SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE REF. - 0.333E-04

PROJECT : SICILY SICILY 21 OBS=1 VER(UNFILT.RDT 01.7 KM/SEC) LINE 1
 28-APR-1983 16:32:51.74 JOB NO. 7778
 POLARITY NORMAL - POSITIVE DATA(49997 MILLS 07.344) PANEL NO. 1
 SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE REF. = 0.2355E+03

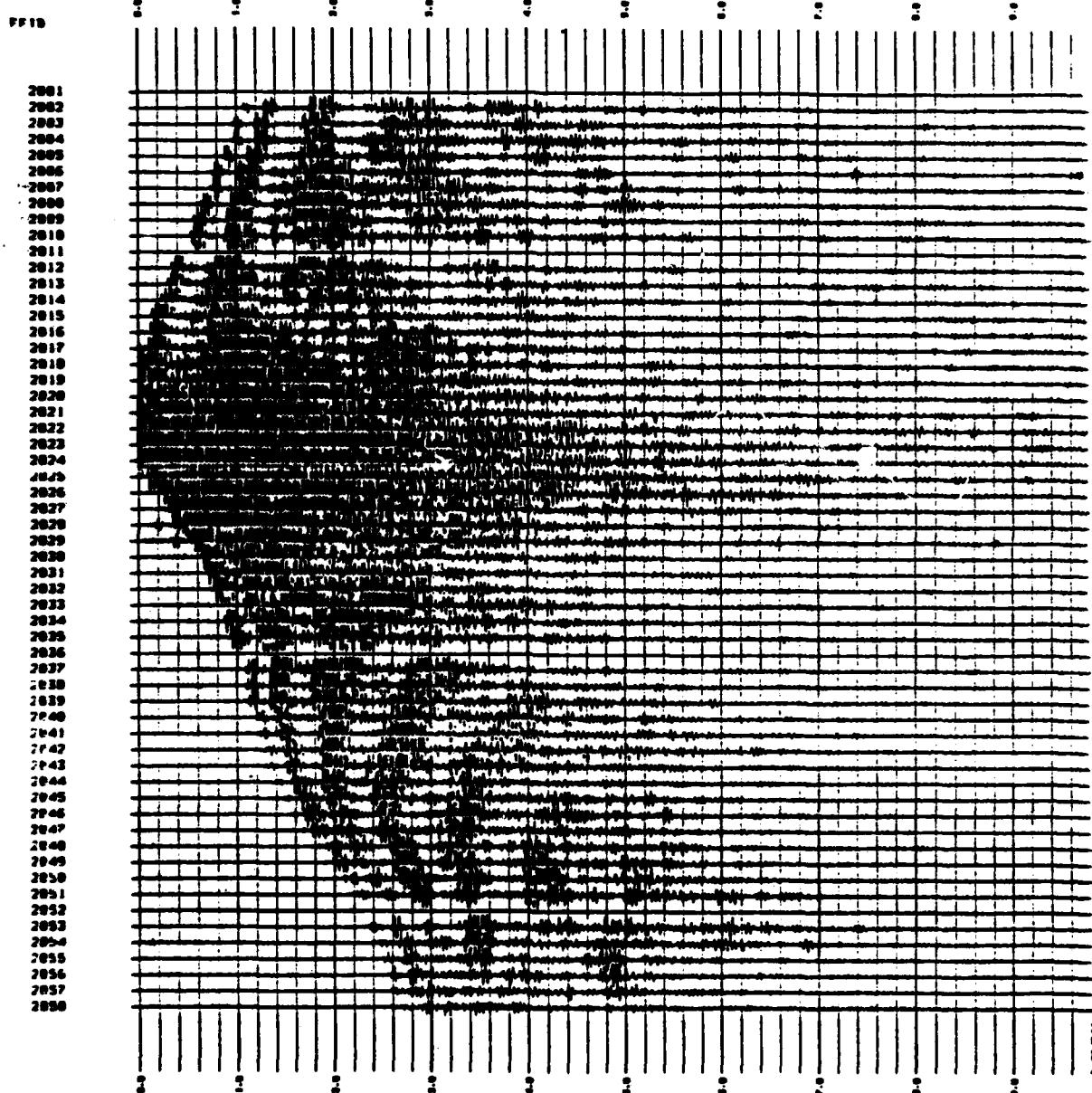
TP10

1001
 1002
 1003
 1004
 1005
 1006
 1007
 1008
 1009
 1010
 1011
 1012
 1013
 1014
 1015
 1016
 1017
 1018
 1019
 1020
 1021
 1022
 1023
 1024
 1025
 1026
 1027
 1028
 1029
 1030
 1031
 1032
 1033
 1034
 1035
 1036
 1037
 1038
 1039
 1040
 1041
 1042
 1043
 1044
 1045
 1046
 1047
 1048
 1049
 1050
 1051
 1052
 1053
 1054
 1055
 1056
 1057
 1058



PROJECT : SICILY	SICILY 21 OBS=1 VER(UNFILT.RDT 01.7 KM/SEC) LINE 1
POLARITY	NORMAL - POSITIVE
DATA	49997 MILLS 07.344
REF.	0.2355E+03
SECOND AVERAGE	USING 4 WINDOWS OVER ENTIRE TRACE
REF. NO.	7778
PANEL NO.	1
DATE	28-APR-1983 16:32:51.74

PROJECT : SICILY SICILY 21 OBS+2 VER(UNFILT.ROT 81.7 KM/SEC) LINE 1
 29-APR-1983 16:35:38.46 JOB NO. 7771
 POLARITY NORMAL - POSITIVE DATA(49997 MILLS 87.344) PANEL NO. 1
 SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE REF. = 8.1923E+03

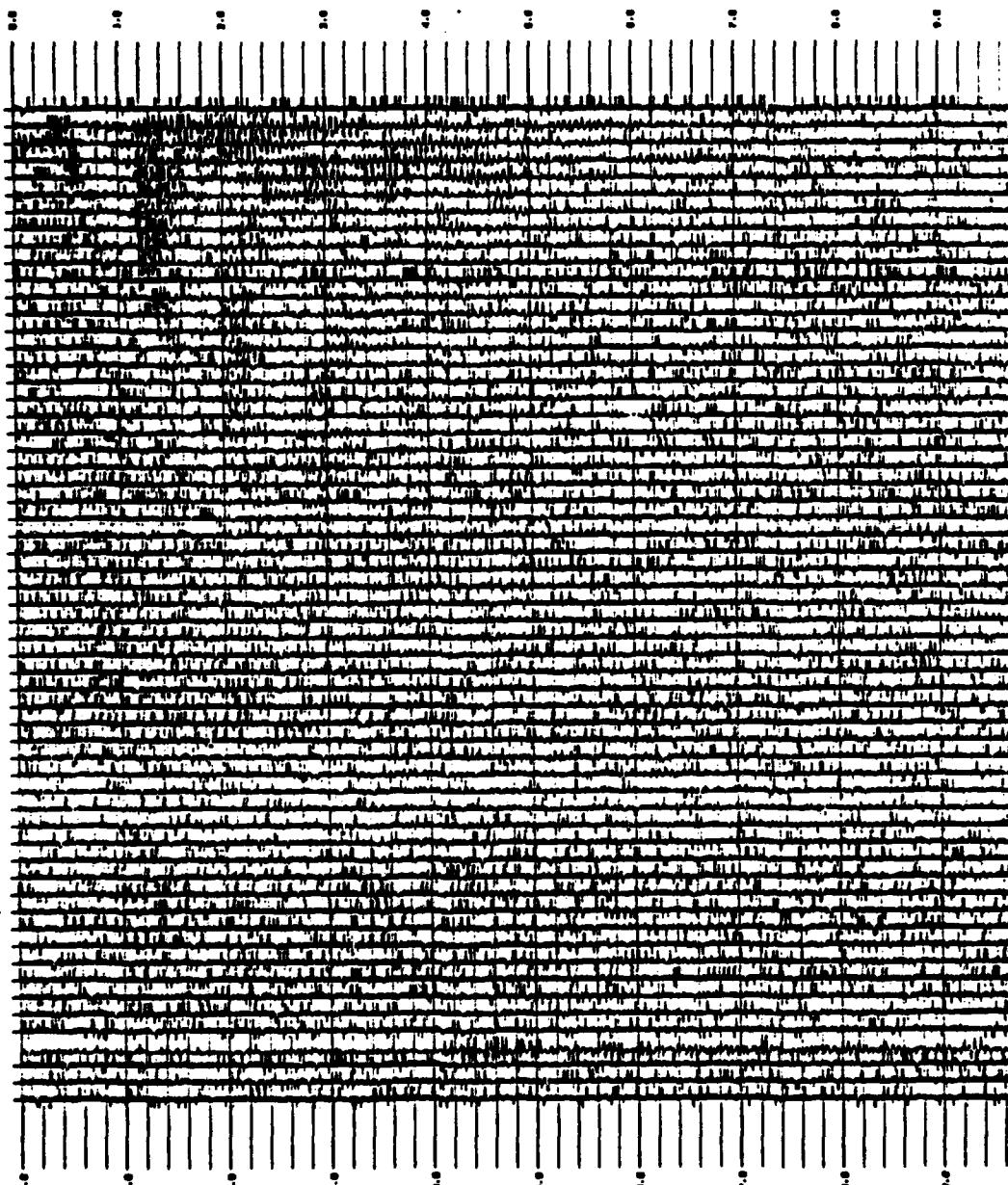


SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE REF. = 8.1923E+03
 POLARITY NORMAL - POSITIVE DATA(49997 MILLS 87.344) PANEL NO. 1
 29-APR-1983 16:35:38.46 JOB NO. 7771
 PROJECT : SICILY SICILY 21 OBS+2 VER(UNFILT.ROT 81.7 KM/SEC) LINE 1

PROJECT : SICILY SICILY 21 08503 VERT(UNFILT.ROT 81.7 KM/SEC) LINE 1
 28-APR-1983 16:38:53.00 JOB NO. 7773
 POLARITY NORMAL - POSITIVE DATA(49997 MILLS 07.344) PANEL NO. 1
 SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE REF. = 8.4838E+03

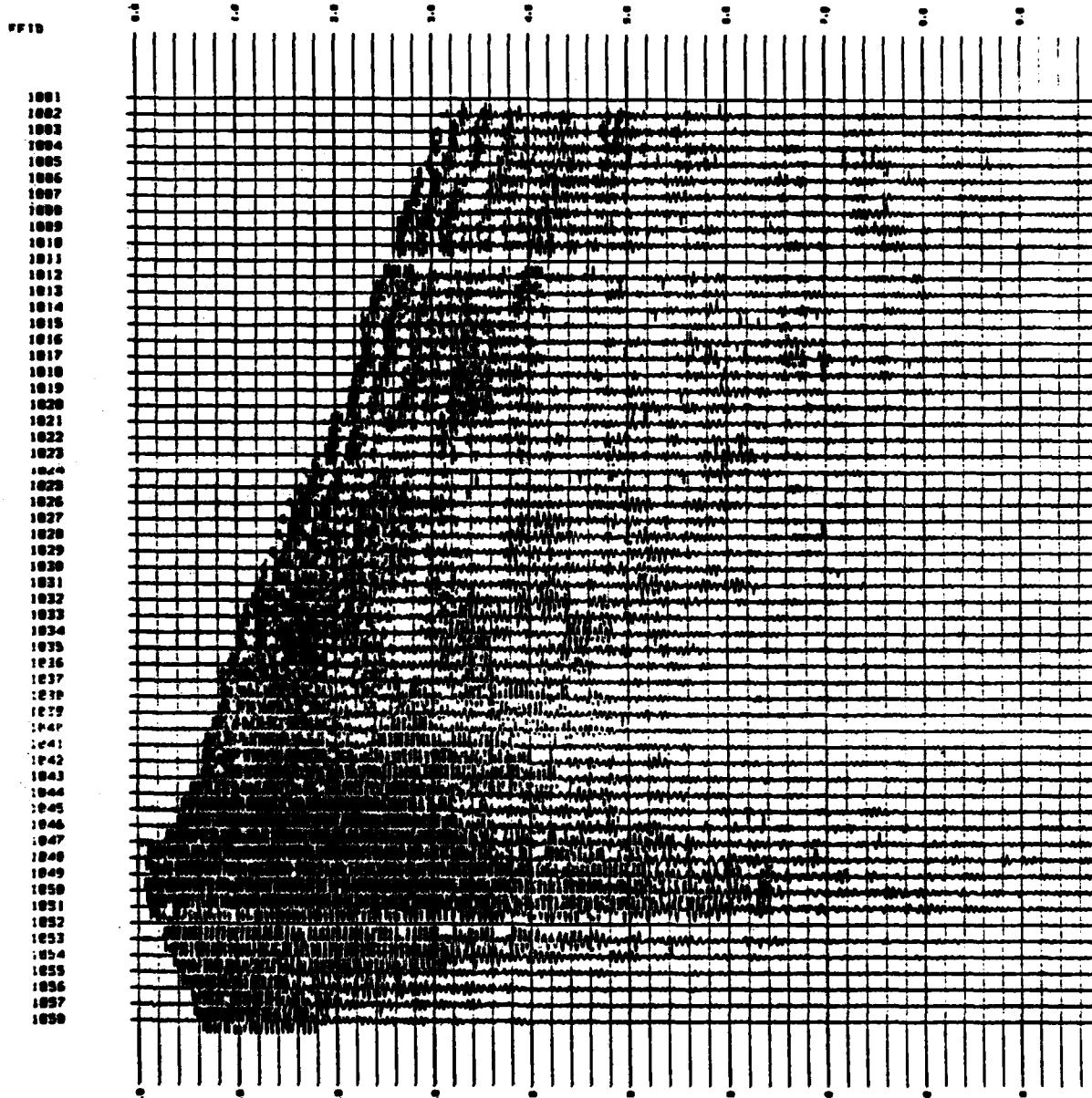
FF10

3001
 3002
 3003
 3004
 3005
 3006
 3007
 3008
 3009
 3010
 3011
 3012
 3013
 3014
 3015
 3016
 3017
 3018
 3019
 3020
 3021
 3022
 3023
 3024
 3025
 3026
 3027
 3028
 3029
 3030
 3031
 3032
 3033
 3034
 3035
 3036
 3037
 3038
 3039
 3040
 3041
 3042
 3043
 3044
 3045
 3046
 3047
 3048
 3049
 3050
 3051
 3052
 3053
 3054
 3055
 3056
 3057
 3058



PROJECT : SICILY SICILY 21 08503 VERT(UNFILT.ROT 81.7 KM/SEC) LINE 1
 28-APR-1983 16:38:53.00 JOB NO. 7773
 POLARITY NORMAL - POSITIVE DATA(49997 MILLS 07.344) PANEL NO. 1
 SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE REF. = 8.4838E+03

PROJECT : SICILY SICILY 21 00861 Rad (UNFILT.ROT 81.7 KHZ) LINE 1
 28-APR-1963 16:50:40.91 JOB NO. 7778
 POLARITY NORMAL - POSITIVE DATA(49997 MILLS 87.344) PANEL NO. 1
 SECOND SURVEY USING 4 UNIBUS OVER ENTIRE TRACE REF. - 8.4977E+03

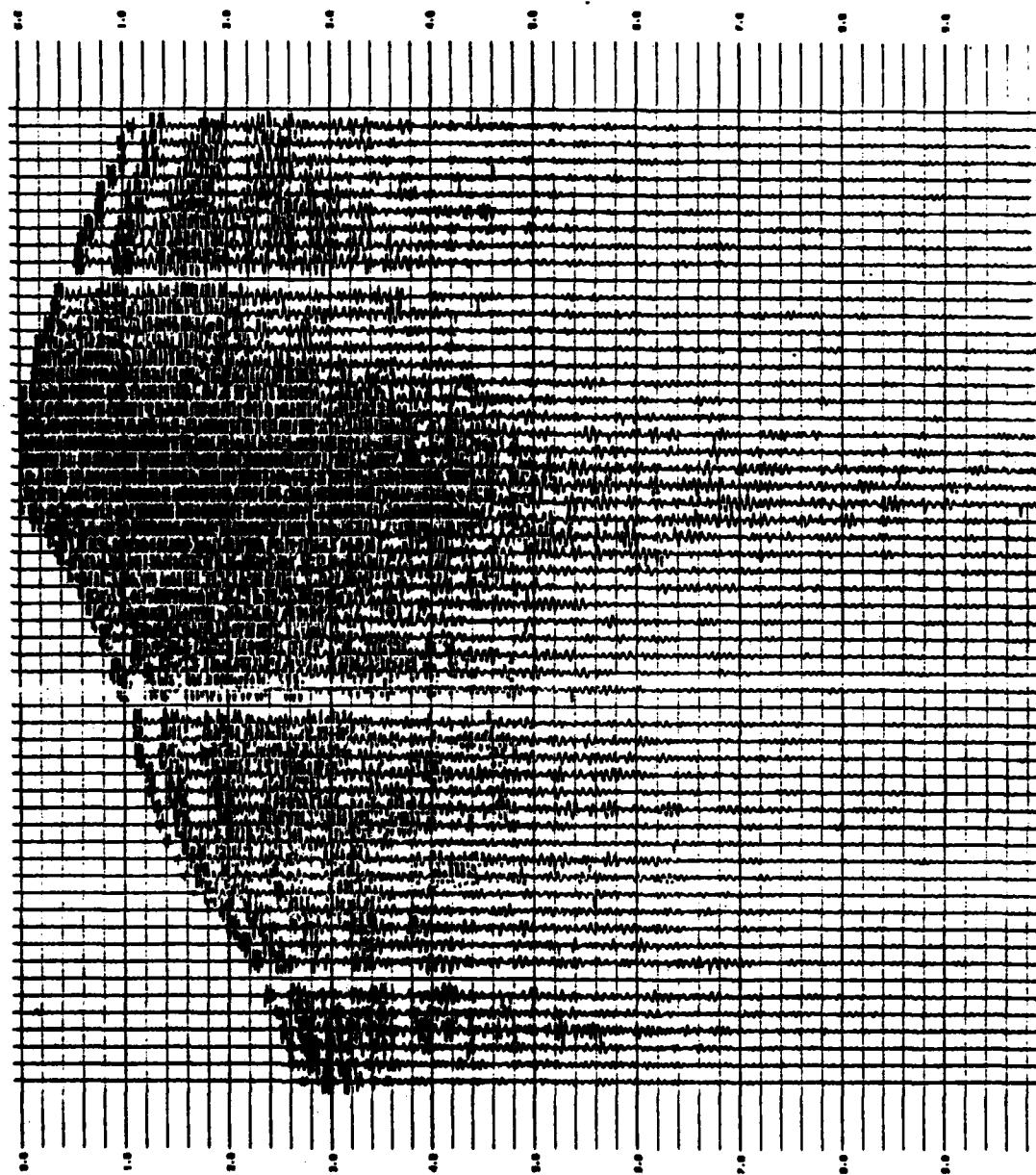


PROJECT : SICILY SICILY 21 00861 Rad (UNFILT.ROT 81.7 KHZ) LINE 1
 28-APR-1963 16:50:40.91 JOB NO. 7778
 POLARITY NORMAL - POSITIVE DATA(49997 MILLS 87.344) PANEL NO. 1
 0.444 0.445 0.446 0.447 0.448 0.449 0.450 0.451 0.452 0.453 0.454 0.455 0.456 0.457 0.458

PROJECT : SICILY SICILY 21 CBS-2 Rad (UNFILT.ROT 01.7 KRASO LINE 1
 20-APR-1983 16:53:12 JOB NO. 7779
 POLARITY NORMAL - POSITIVE DATA(49997 MILLS 07.344) PANEL NO. 1
 SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE REF. = 0.6124E+03

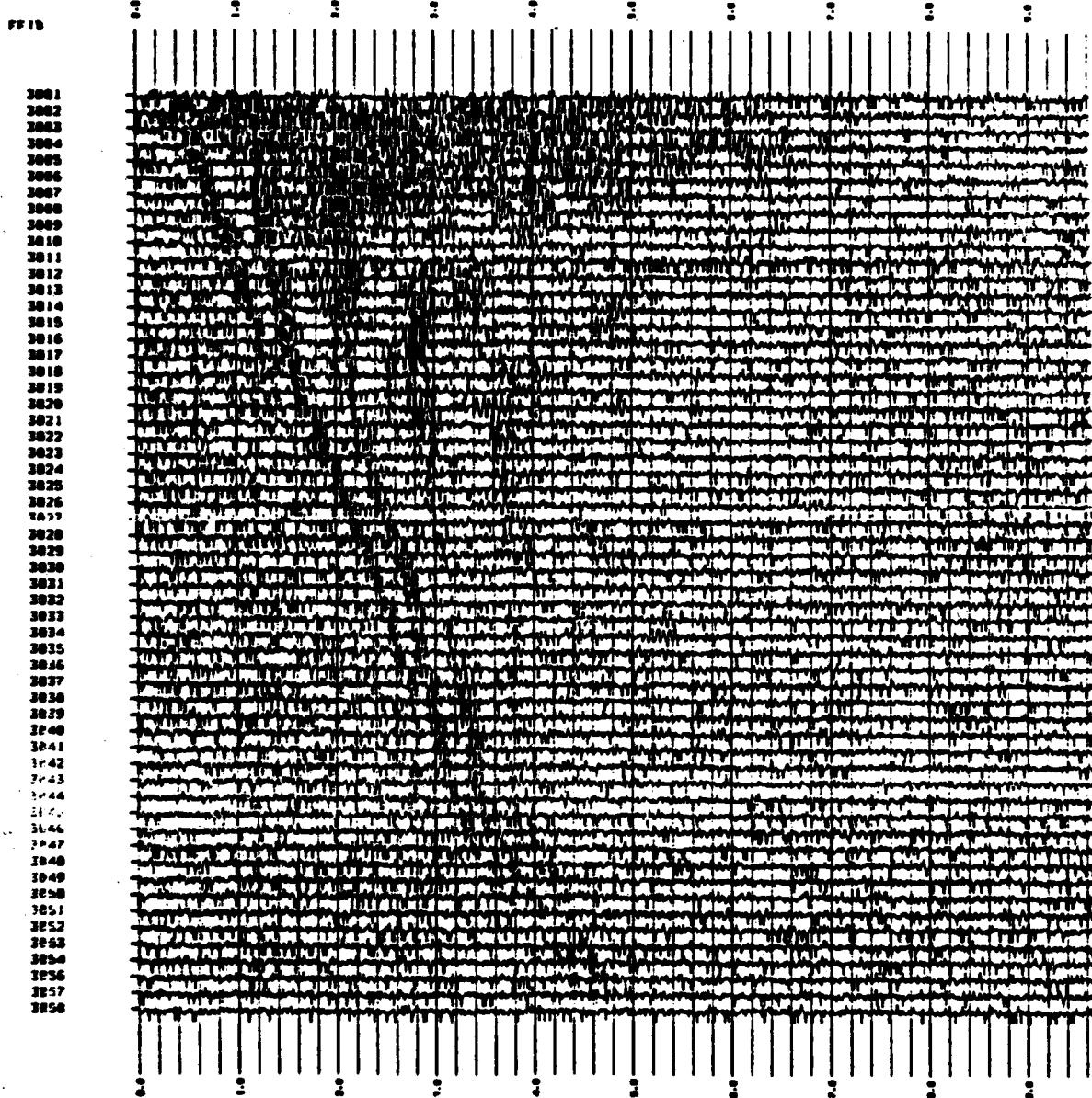
FFID

2001
 2002
 2003
 2004
 2005
 2006
 2007
 2008
 2009
 2010
 2011
 2012
 2013
 2014
 2015
 2016
 2017
 2018
 2019
 2020
 2021
 2022
 2023
 2024
 2025
 2026
 2027
 2028
 2029
 2030
 2031
 2032
 2033
 2034
 2035
 2036
 2037
 2038
 2039
 2040
 2041
 2042
 043
 044
 045
 046
 047
 048
 049
 050
 051
 052
 053
 054
 055
 056
 057
 058



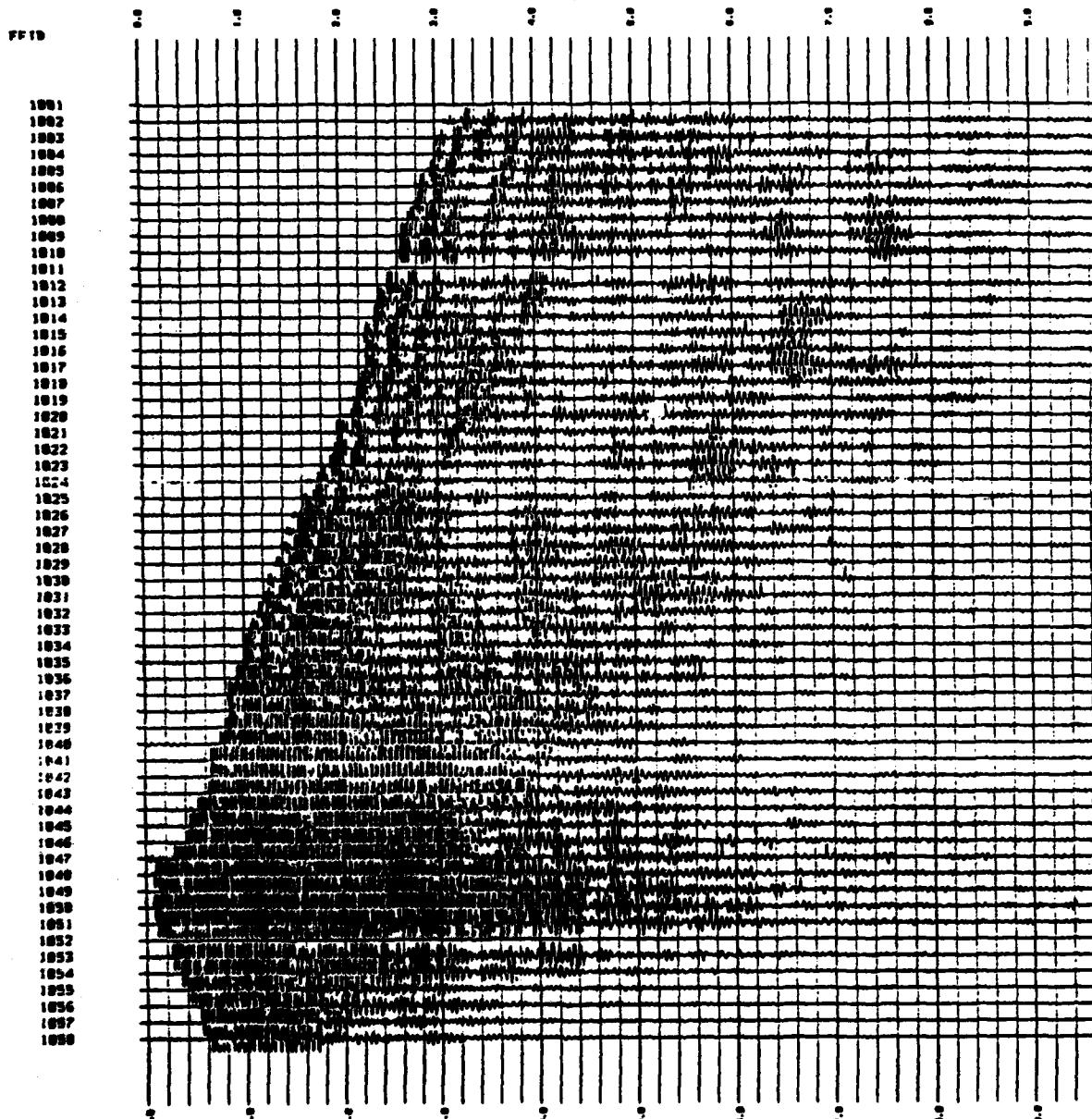
PROJECT : SICILY SICILY 21 CBS-2 Rad (UNFILT.ROT 01.7 KRASO LINE 1
 20-APR-1983 16:53:12 JOB NO. 7779
 POLARITY NORMAL - POSITIVE DATA(49997 MILLS 07.344) PANEL NO. 1
 SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE REF. = 0.6124E+03

PROJECT : SICILY SICILY 21 088-3 Rad (UNFILT.ROT 01.7 KM/SED LINE 1
 28-APR-1983 16:55:45.14 JOB NO. 7788
 POLARITY NORMAL - POSITIVE DATA(49997 MILLS 07.344) PANEL NO. 1
 SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE REF. = 0.5945E+03



PROJECT : SICILY SICILY 21 088-3 Rad (UNFILT.ROT 01.7 KM/SED LINE 1
 28-APR-1983 16:55:45.14 JOB NO. 7788
 POLARITY NORMAL - POSITIVE DATA(49997 MILLS 07.344) PANEL NO. 1
 SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE REF. = 0.5945E+03

PROJECT : SICILY SICILY 21 OBS:1 TR8 (UNFILT.ROT 81.7 KM/SEC) LINE 1
 28-APR-1983 16:42:06.89 JOB NO. 7775
 POLARITY NORMAL - POSITIVE DATA(49997 MILES 07.344) PANEL NO. 1
 SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE REF. = 8.6437E+03

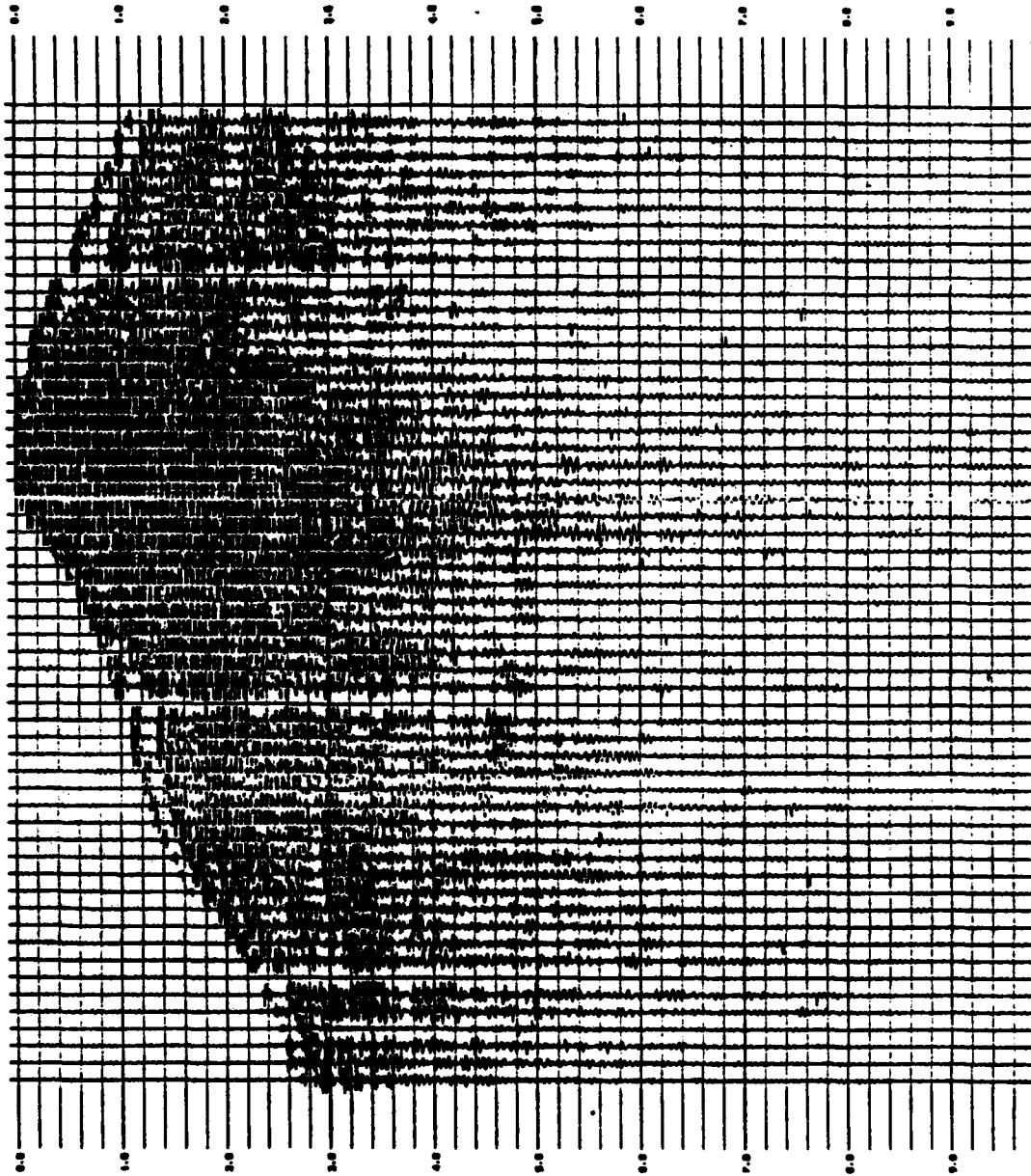


SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE REF. = 8.6437E+03
 POLARITY NORMAL - POSITIVE DATA(49997 MILES 07.344) PANEL NO. 1
 PROJECT : SICILY SICILY 21 OBS:1 TR8 (UNFILT.ROT 81.7 KM/SEC) LINE 1
 28-APR-1983 16:42:06.89 JOB NO. 7775

PROJECT : SICILY SICILY 21 005027 FRANKFILT.ROT 81.7 KM/SEC LINE 1
 20-APR-1983 16:44:43.95 JOB NO. 7776
 POLARITY NORMAL - POSITIVE DATA(49997 MILLS SP.340) PANEL NO. 1
 SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE REF. = 0.9499E+03

FFID

2001
 2002
 2003
 2004
 2005
 2006
 2007
 2008
 2009
 2010
 2011
 2012
 2013
 2014
 2015
 2016
 2017
 2018
 2019
 2020
 2021
 2022
 2023
 2024
 2025
 2026
 2027
 2028
 2029
 2030
 2031
 2032
 2033
 2034
 2035
 2036
 2037
 2038
 2039
 2040
 2041
 2042
 2043
 2044
 2045
 2046
 2047
 2048
 2049
 2050
 2051
 2052
 2053
 2054
 2055
 2056
 2057
 2058

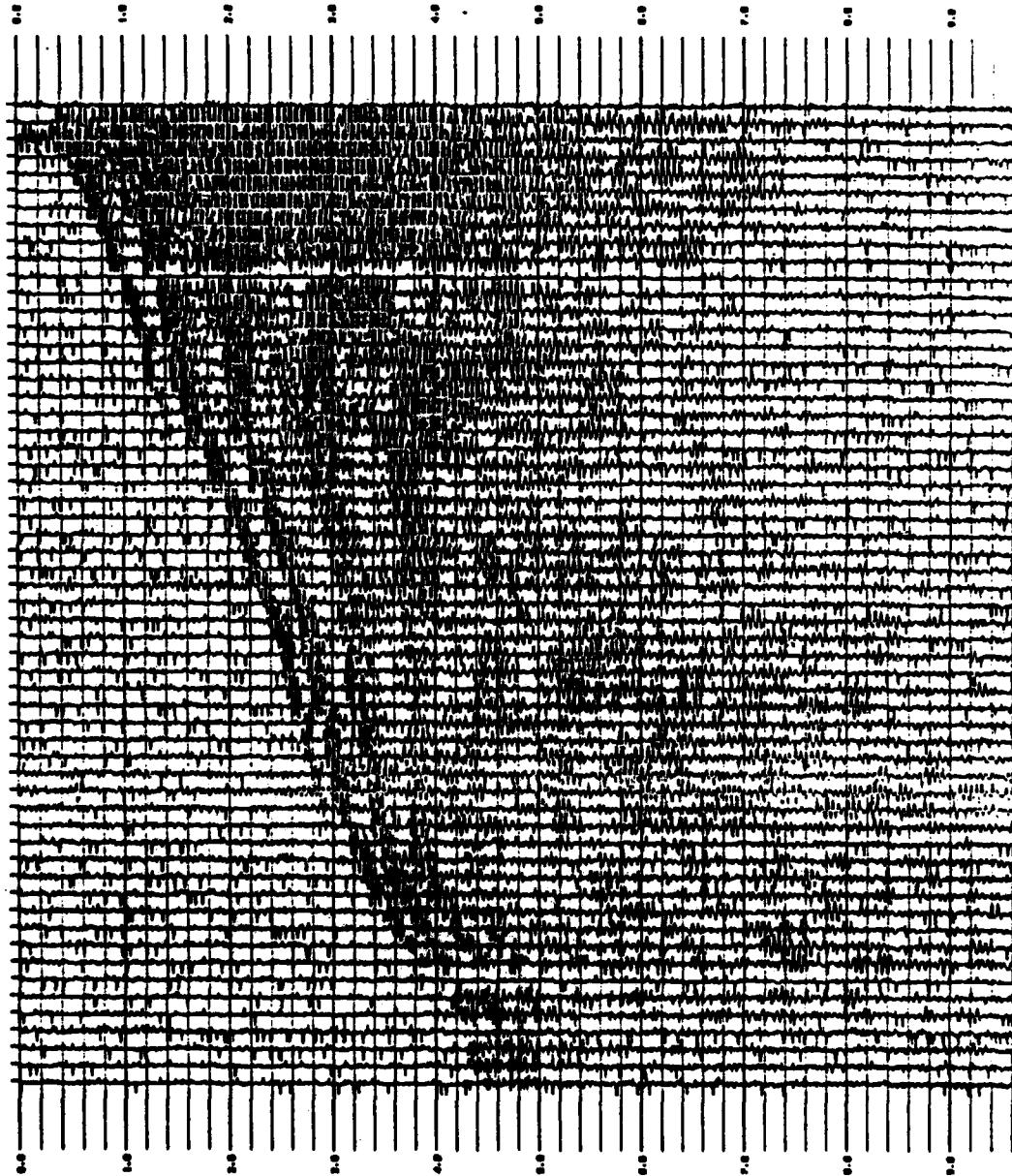


PROJECT : SICILY SICILY 21 005027 FRANKFILT.ROT 81.7 KM/SEC LINE 1
 20-APR-1983 16:44:43.95 JOB NO. 7776
 POLARITY NORMAL - POSITIVE DATA(49997 MILLS SP.340) PANEL NO. 1
 SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE REF. = 0.9499E+03

PROJECT : SICILY SICILY 21 08563 T(BUNFILT.ROT 01.7 KM/SEC) LINE 1
 20-APR-1983 16:47:28.58 JOB NO. 7777
 POLARITY NORMAL - POSITIVE DATA(49997 MILLS 07.344) PANEL NO. 1
 SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE REF. = 0.6006E+03

PP10

3801
 3802
 3803
 3804
 3805
 3806
 3807
 3808
 3809
 3810
 3811
 3812
 3813
 3814
 3815
 3816
 3817
 3818
 3819
 3820
 3821
 3822
 3823
 3824
 3825
 3826
 3827
 3828
 3829
 3830
 3831
 3832
 3833
 3834
 3835
 3836
 3837
 3838
 3839
 3840
 3841
 3842
 3843
 3844
 3845
 3846
 3847
 3848
 3849
 3850
 3851
 3852
 3853
 3854
 3855
 3856
 3857
 3858

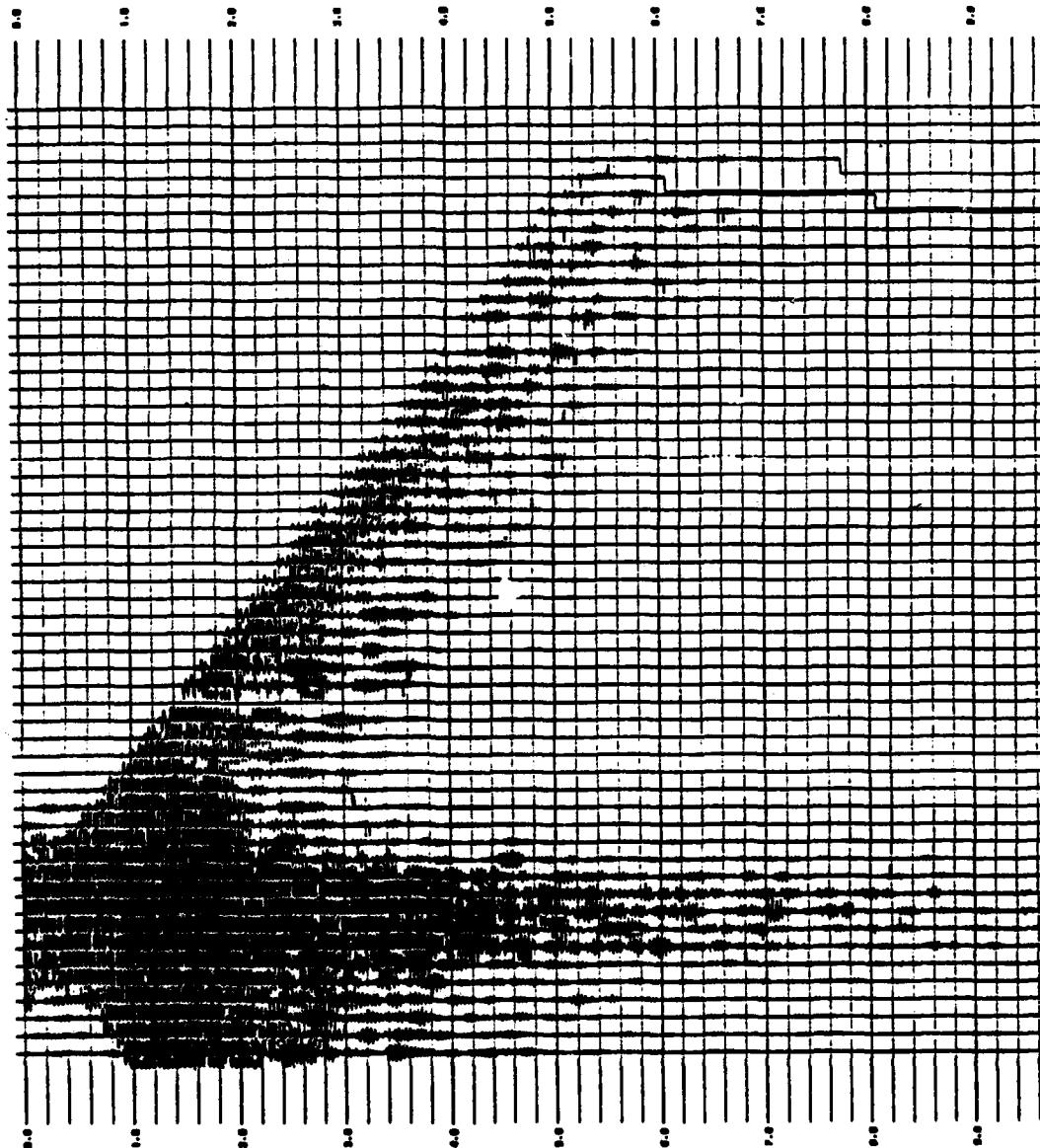


PROJECT : SICILY SICILY 21 08563 T(BUNFILT.ROT 01.7 KM/SEC) LINE 1
 20-APR-1983 16:47:28.58 JOB NO. 7777
 POLARITY NORMAL - POSITIVE DATA(49997 MILLS 07.344) PANEL NO. 1
 SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE REF. = 0.6006E+03

PROJECT : SICILY SICILY 22 OBS+1 VERT (UNFILT.RDT 81.7 KVSEC) LINE 2
 21-APR-1983 14:26:27.03 JOB NO. 7842
 POLARITY NORMAL - POSITIVE DATA(59993 MILLS 07.344) PANEL NO. 1
 SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE REF. - 8.7942E+03

FF20

1001
 1002
 1003
 1004
 1005
 1006
 1007
 1008
 1009
 1010
 1011
 1012
 1013
 1014
 1015
 1016
 1017
 1018
 1019
 1020
 1021
 1022
 1023
 1024
 1025
 1026
 1027
 1028
 1029
 1030
 1031
 1032
 1033
 1034
 1035
 1036
 1037
 1038
 1039
 1040
 1041
 1042
 1043
 1044
 1045
 1046
 1047
 1048
 1049
 1050
 1051
 1052
 1053
 1054
 1055

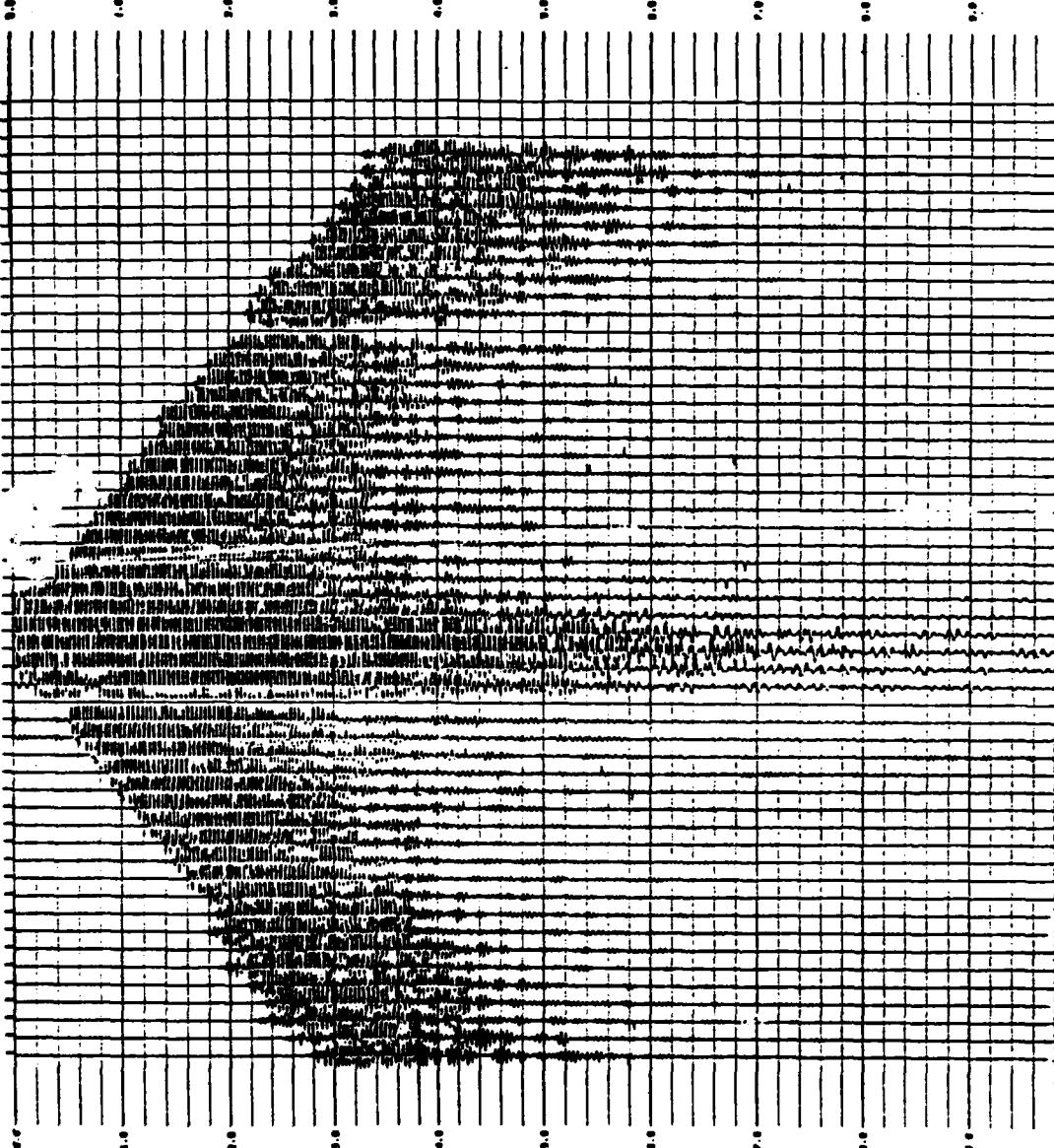


PROJECT : SICILY	SICILY 22 OBS+1 VERT (UNFILT.RDT 81.7 KVSEC) LINE	2
POLARITY NORMAL - POSITIVE	DATA(59993 MILLS 07.344)	PANEL NO.
SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE	REF. - 8.7942E+03	
21-APR-1983 14:26:27.03	JOB NO.	7842

PROJECT : SICILY SICILY 22 OBS+2 VERT (UNFILT.ROT 81.7 KMSIC) LINE 2
 21-APR-1983 14:29:14.19
 POLARITY NORMAL - POSITIVE DATA(59952 MILES 87.344) JOB NO. 7843
 SECOND AVERAGE USING 4 UNDODS OVER ENTIRE TRACE PANEL NO. 1
 REF. = 8.1133E+84

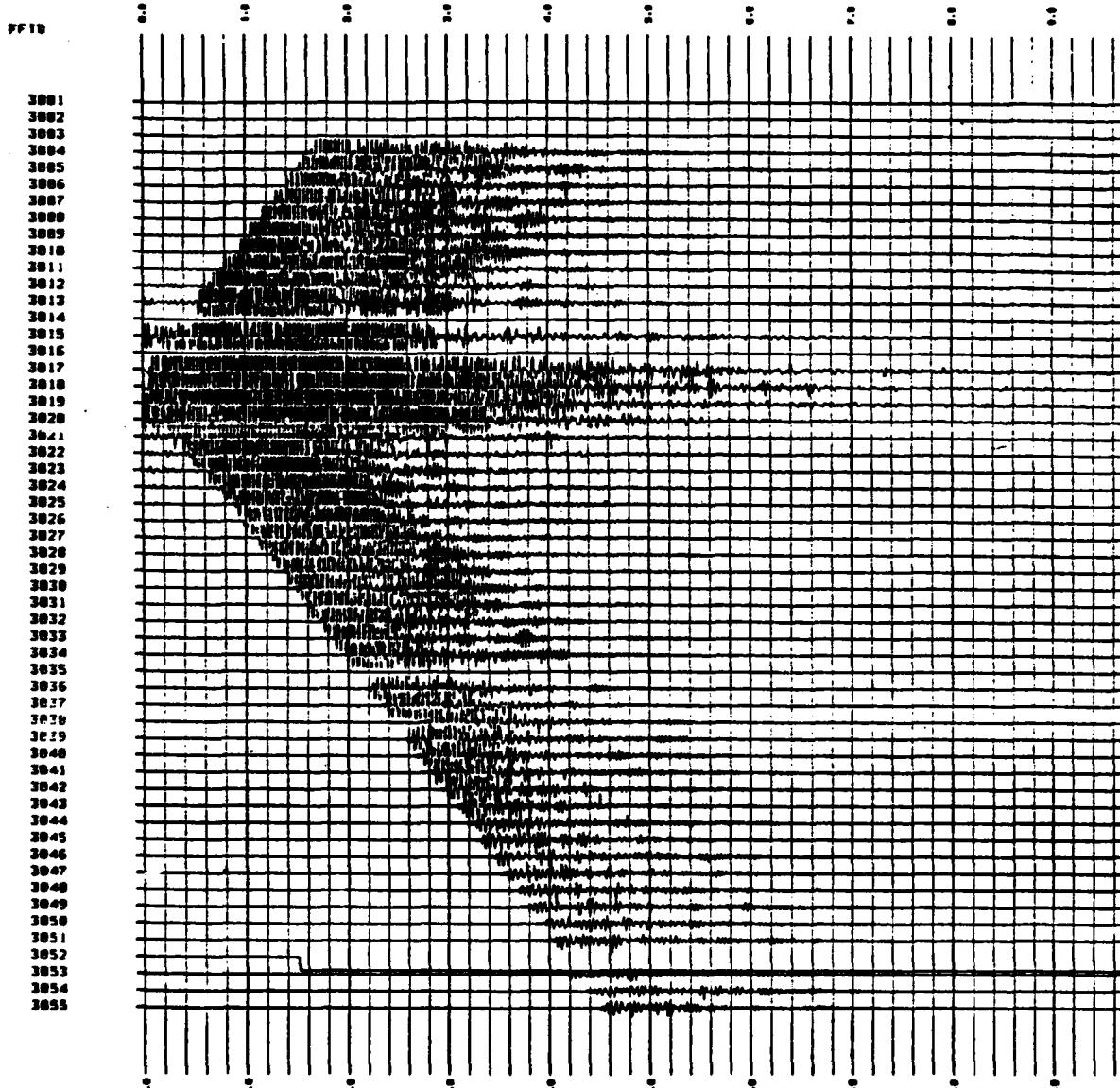
FFID

2801
 2802
 2803
 2804
 2805
 2806
 2807
 2808
 2809
 2810
 2811
 2812
 2813
 2814
 2815
 2816
 2817
 2818
 2819
 2820
 2821
 2822
 2823
 2824
 2825
 2826
 2827
 2828
 2829
 2830
 2831
 2832
 2833
 2834
 2835
 2836
 2837
 2838
 2839
 2840
 2841
 2842
 2843
 2844
 2845
 2846
 2847
 2848
 2849
 2850
 2851
 2852
 2853
 2854
 2855



PROJECT : SICILY SICILY 22 OBS+2 VERT (UNFILT.ROT 81.7 KMSIC) LINE 2
 21-APR-1983 14:29:14.19
 POLARITY NORMAL - POSITIVE DATA(59952 MILES 87.344) JOB NO. 7843
 SECOND AVERAGE USING 4 UNDODS OVER ENTIRE TRACE REF. = 8.1133E+84
 PANEL NO. 1

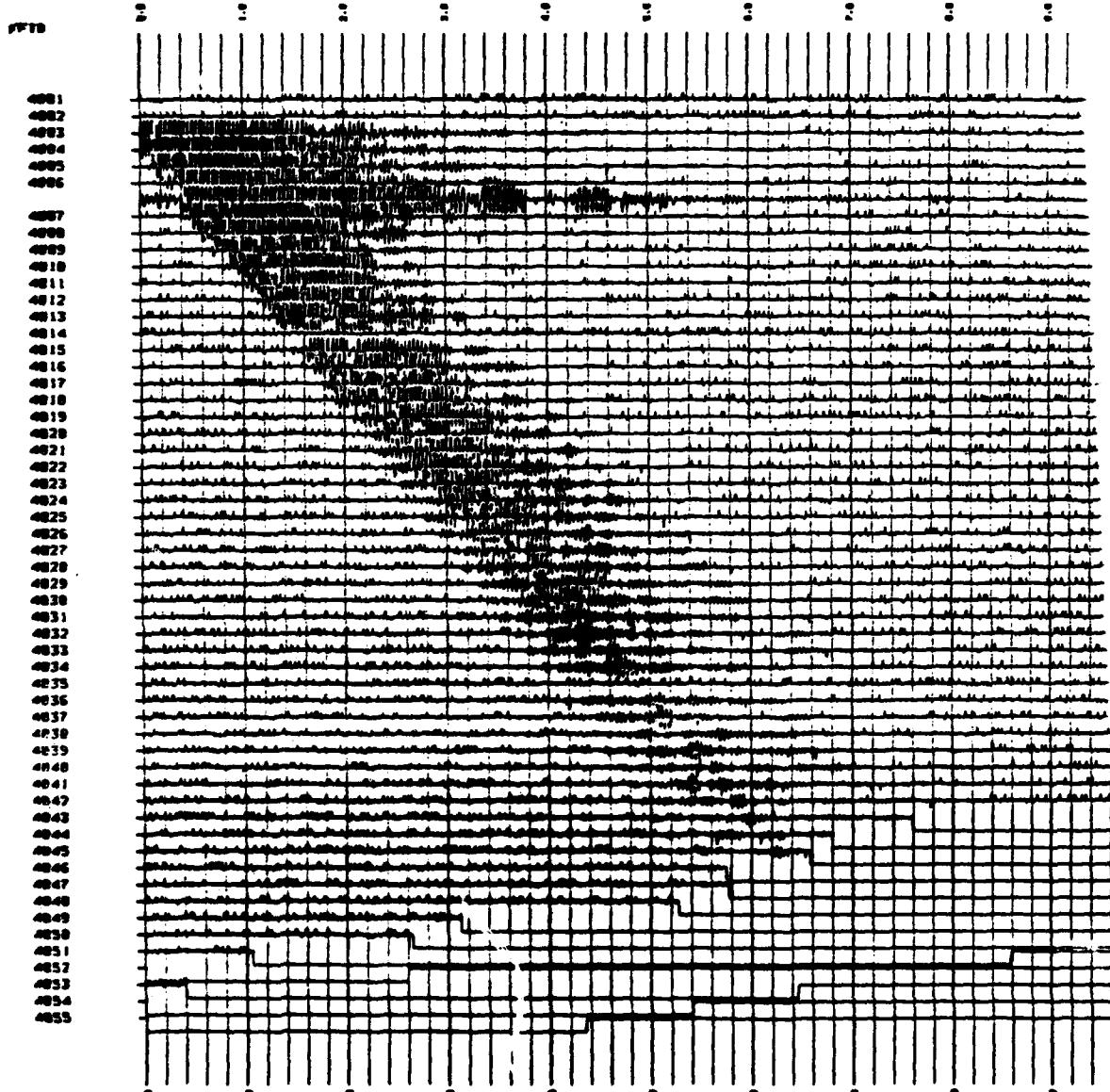
PROJECT : SICILY SICILY 22 08503 VERT (UNFILT.ROT 01.7 KM/SID) LINE 2
 21-APR-1983 14:32:38.38 JOB NO. 7846
 POLARITY NORMAL - POSITIVE DATA(59993 MILLS 07.344) PANEL NO. 1
 SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE REF. = 0.3958E+03



SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE
 REF. = 0.3958E+03
 POLARITY NORMAL - POSITIVE DATA(59993 MILLS 07.344) PANEL NO. 1
 JOB NO. 7846
 21-APR-1983 14:32:38.38

PROJECT : SICILY SICILY 22 08503 VERT (UNFILT.ROT 01.7 KM/SID) LINE 2

PROJECT : SICILY SICILY 22 OBS+4 WEST (CONFILT.GOT 81.7 KM SEC) LINE 2
 21-APR-1983 14:35:44.78 JOB NO. 7847
 POLARITY NORMAL - POSITIVE DATAFILE NUMBER 07.3441 PANEL NO. 1
 SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE REF. = B.1344E+84

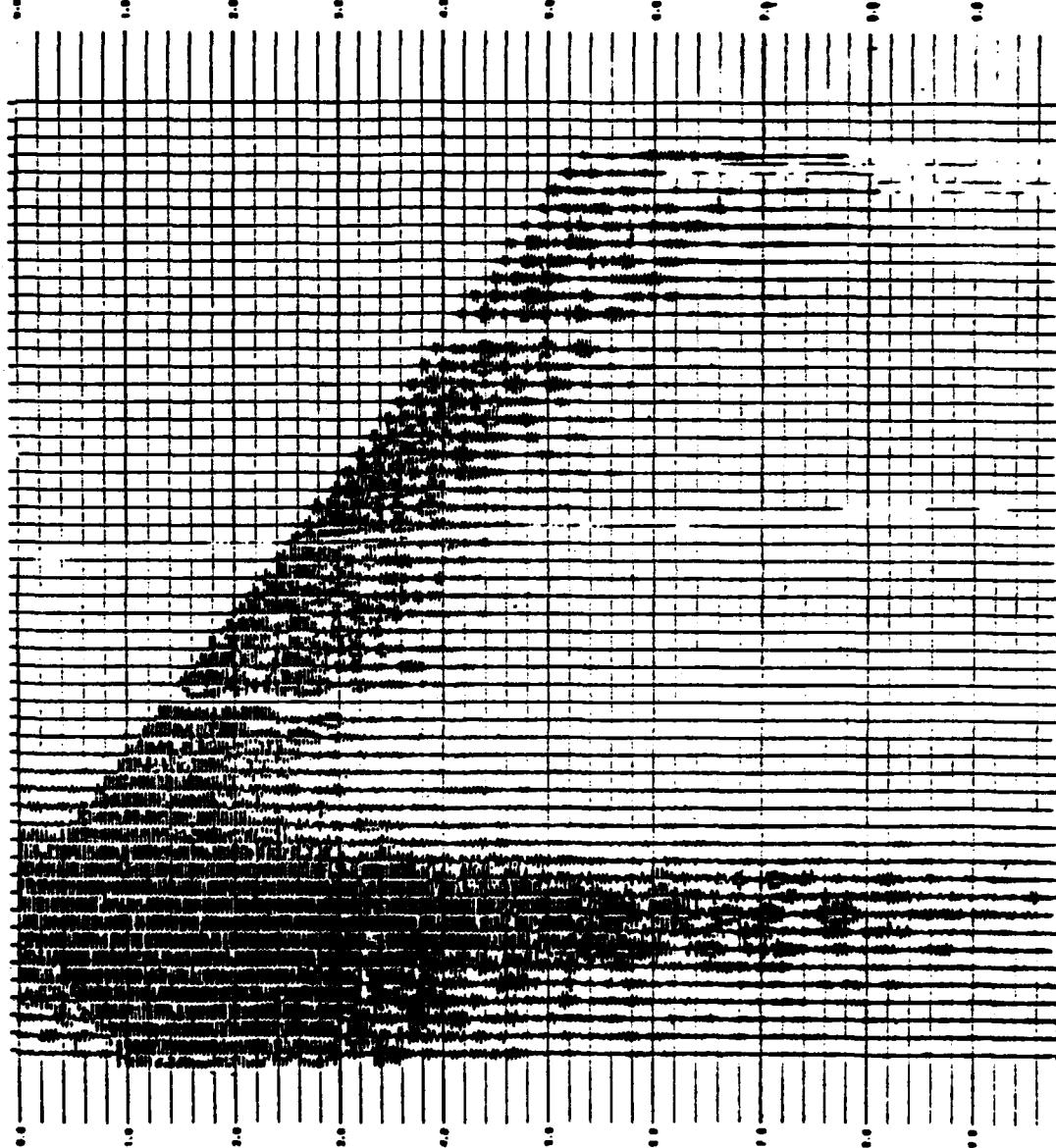


SECONDS NUMBER SOURCE & RECEIVER DATE TIME
 POLARITY NUMBER - POSITION SOURCE & RECEIVER DATE TIME
 21-APR-1983 14:35:44.78 07.3441 07.3441 21-APR-1983 14:35:44.78
 SICILY 22 OBS+4 WEST (CONFILT.GOT 81.7 KM SEC) LINE 2 SICILY 22 OBS+4 WEST (CONFILT.GOT 81.7 KM SEC) LINE 2

PROJECT : SICILY SICILY 22 08501 RAD (UNFILT.ROT 01.7 ENCODED LINE) 2
 21-MP8-1903 14:52:35.95 JSD NO. PMP
 POLARITY NORMAL - POSITIVE DATA(59993 MILLS 07.344) PANEL NO. 1
 SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE REF. = 0.2573E+00

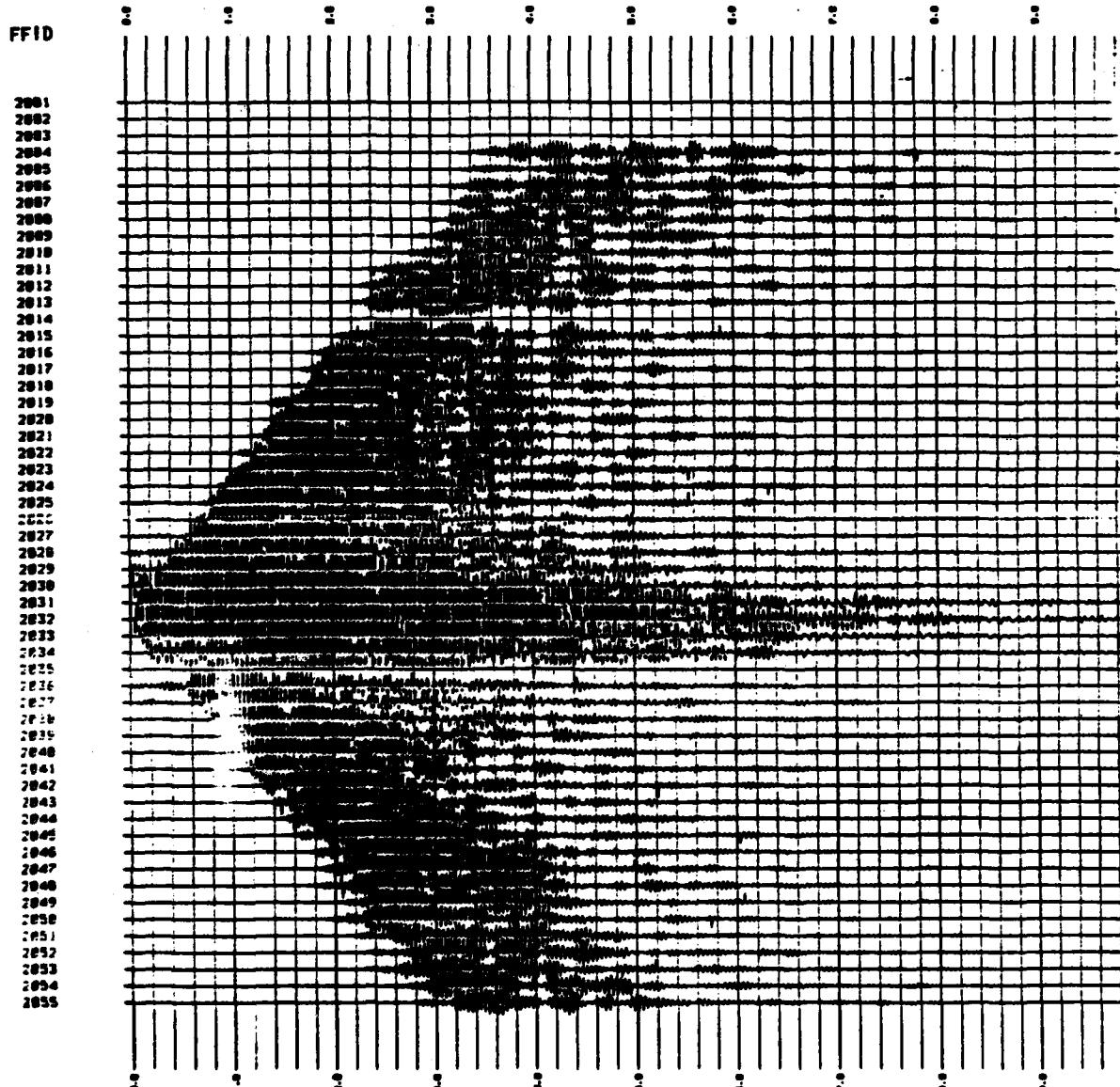
FFID

1001
1002
1003
1004
1005
1006
1007
1008
1009
1010
1011
1012
1013
1014
1015
1016
1017
1018
1019
1020
1021
1022
1023
1024
1025
1026
1027
1028
1029
1030
1031
1032
1033
1034
1035
1036
1037
1038
1039
1040
1041
1042
1043
1044
1045
1046
1047
1048
1049
1050
1051
1052
1053
1054
1055



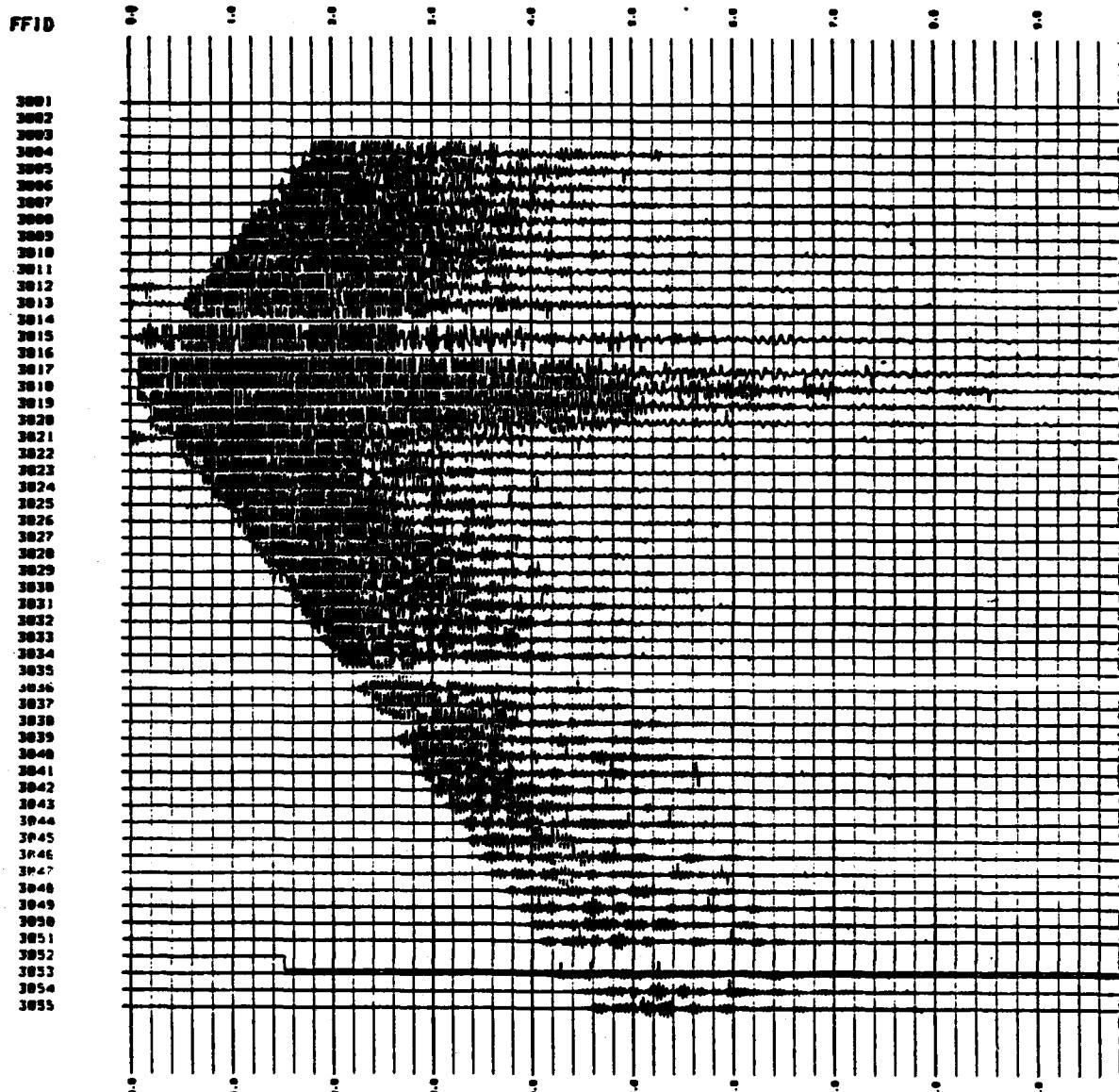
SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE REF. = 0.2573E+00
 POLARITY NORMAL - POSITIVE DATA(59993 MILLS 07.344) PANEL NO. 1
 21-MP8-1903 14:52:35.95 JSD NO. PMP
 SICILY 22 08501 RAD (UNFILT.ROT 01.7 ENCODED LINE) 2

PROJECT : SICILY SICILY 22 088+2Radiationfilt.BOT 01.7 KFMG LINE 2
 21-MAR-1963 14:56:10.64 JOB NO. 7859
 POLARITY NORMAL - POSITIVE DATA(9993 MILES 87.344) PANEL NO. 1
 SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE REF. = 0.3629E+04



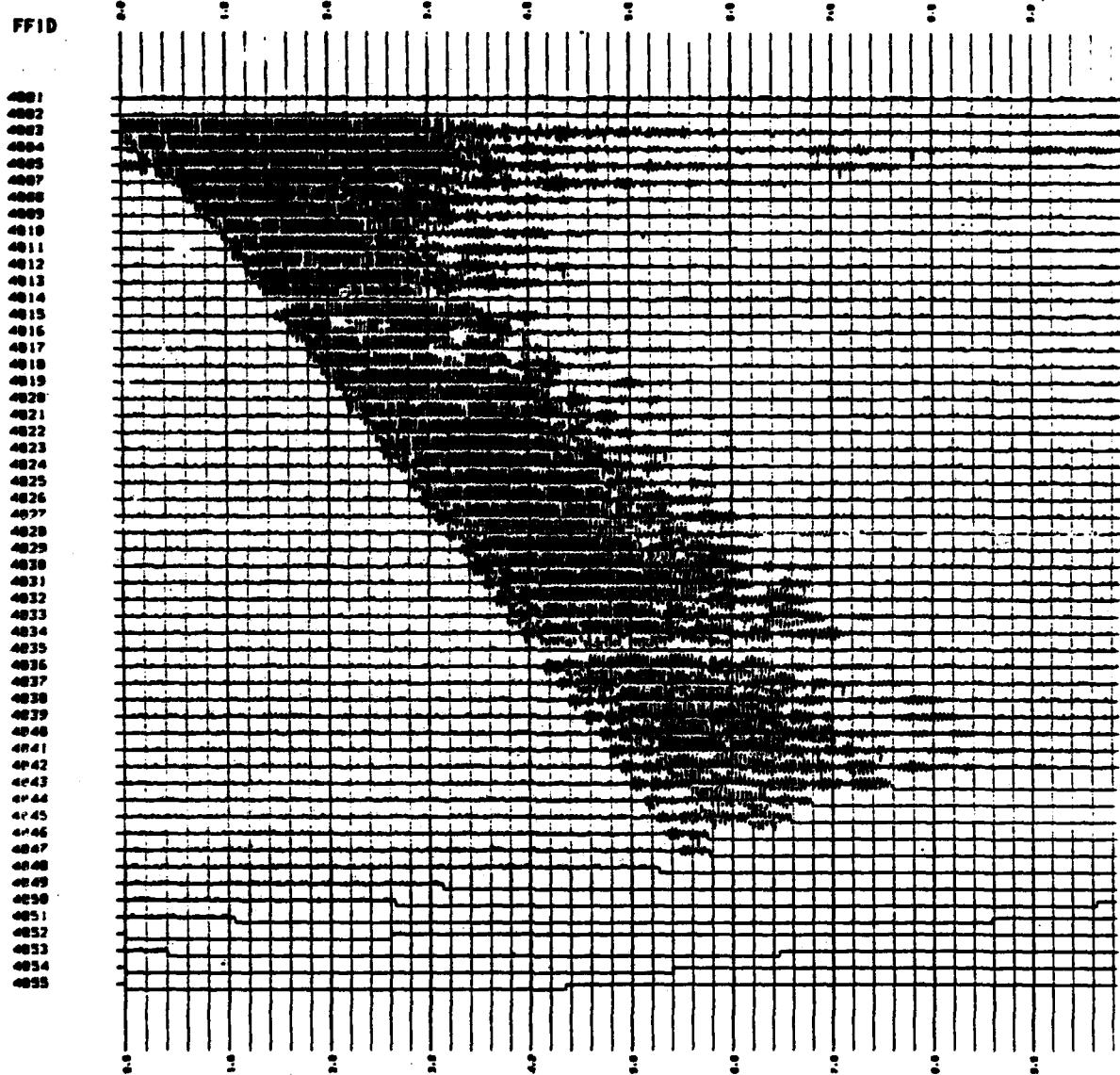
PROJECT : SICILY	SICILY 22 088+2Radiationfilt.BOT 01.7 KFMG LINE 2	REF. = 0.3629E+04
POLARITY NORMAL - POSITIVE	DATA(9993 MILES 87.344)	PANEL NO. 1
SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE	21-MAR-1963 14:56:10.64	JOB NO. 7859

PROJECT : SICILY SICILY 22 08503 Rad (UNFILT.RBT 81.7 MPH) LINE 2
 21-APR-1963 15:01:19.00 JOB NO. 7061
 POLARITY NORMAL - POSITIVE DATA(55553 MILS 07-344) PANEL NO. 1
 SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE REF. = 0.2362E+04



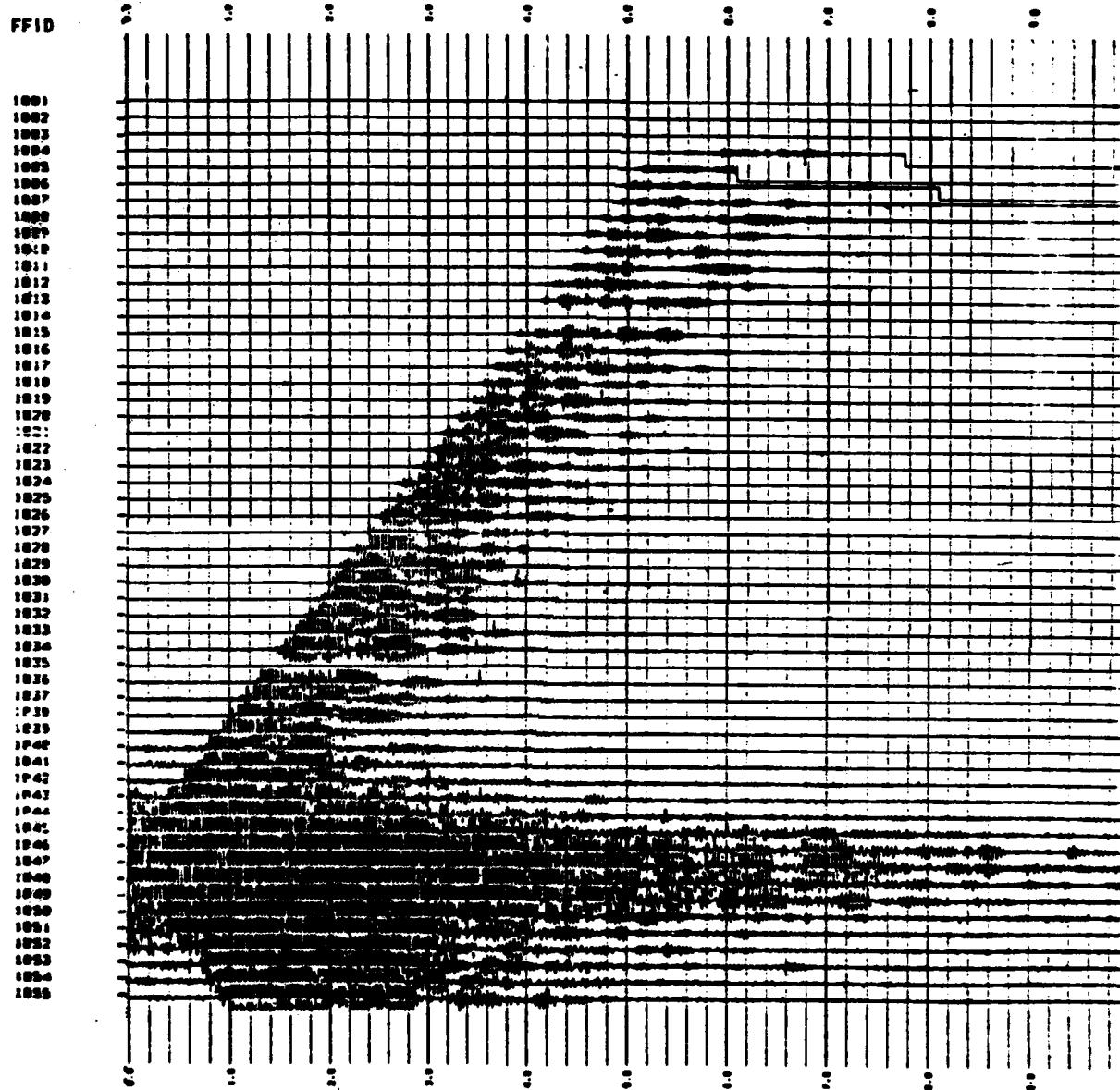
SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE REF. = 0.2362E+04
 POLARITY NORMAL - POSITIVE DATA(55553 MILS 07-344) PANEL NO. 1
 PROJECT : SICILY SICILY 22 08503 Rad (UNFILT.RBT 81.7 MPH) LINE 2
 21-APR-1963 15:01:19.00 JOB NO. 7061

PROJECT : SICILY SICILY 22 08844 Rad INFILT.RPT 01.7 SOUND LINE 2
 21-APR-1963 15:04:26.60 JOB NO. 7062
 POLARITY NORMAL - POSITIVE DATA139993 MILLS 0P.3441 PANEL NO. 1
 SECOND AVERAGE USING 4 WINDS OVER ENTIRE TRACE REF. - 0.2519E+04



PROJECT : SICILY SICILY 22 08844 Rad INFILT.RPT 01.7 SOUND LINE 2
 21-APR-1963 15:04:26.60 JOB NO. 7062
 POLARITY NORMAL - POSITIVE DATA139993 MILLS 0P.3441 PANEL NO. 1
 SECOND AVERAGE USING 4 WINDS OVER ENTIRE TRACE REF. - 0.2519E+04

PROJECT : SICILY SICILY 22 0050 1 Tran (UNFILT. 007 01.7 SWED LINE 2
 21-APR-1983 14:30:17.99 JRD NO. 7848
 POLARITY NORMAL - POSITIVE DATA(3999) MILLS 07.3401 PANEL NO. 1
 SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE REF. = 0.2439E+04

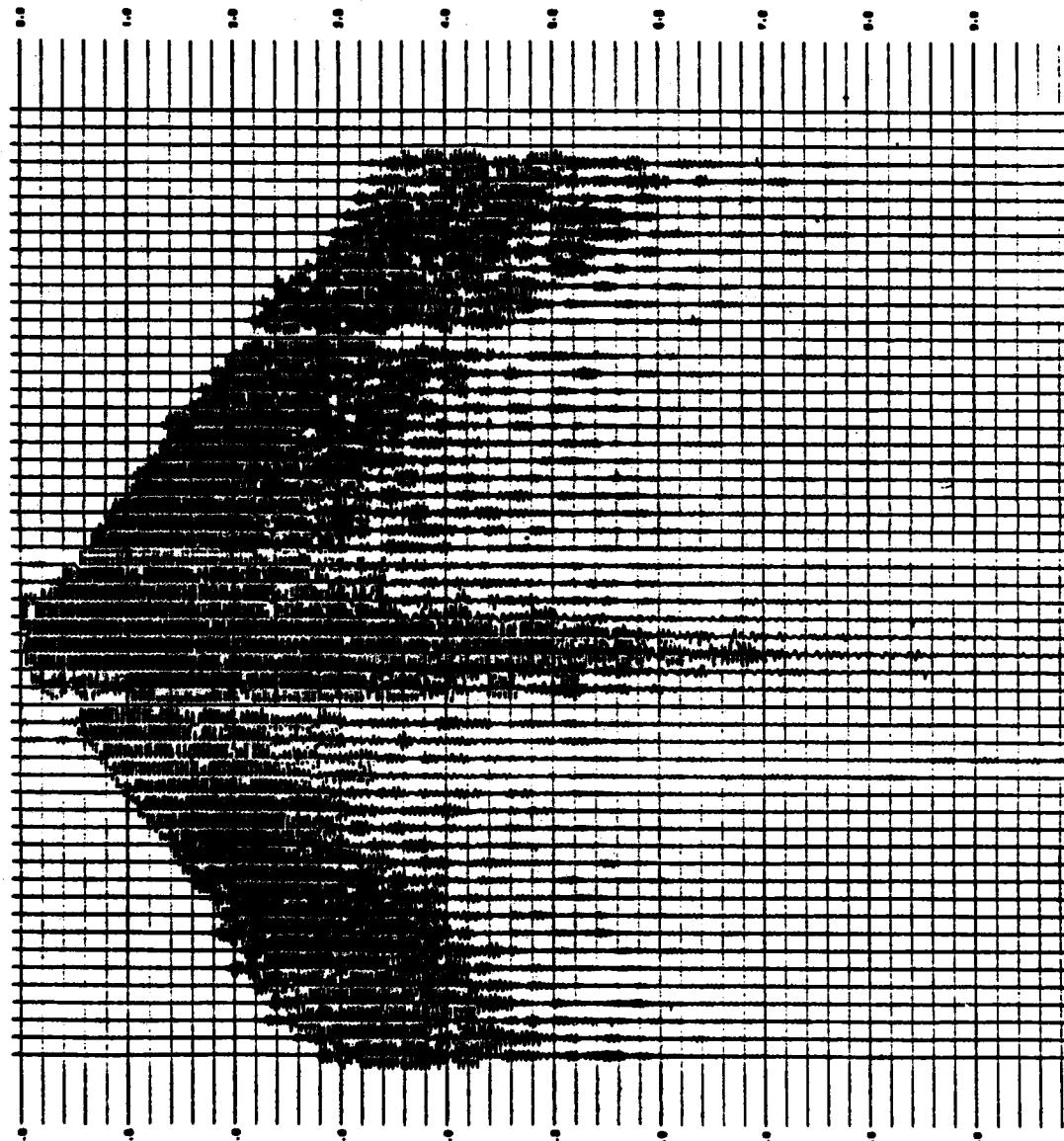


PROJECT : SICILY SICILY 22 0050 1 Tran (UNFILT. 007 01.7 SWED LINE 2
 21-APR-1983 14:30:17.99 JRD NO. 7848
 POLARITY NORMAL - POSITIVE DATA(3999) MILLS 07.3401 PANEL NO. 1
 SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE REF. = 0.2439E+04

PROJECT : SICILY SICILY 22 000+ 2 TFS (UNFILT.ROT 01.7) SWING LINE 2
 21-090-1983 14:42:27.35 JOB NO. 7851
 POLARITY NORMAL - POSITIVE DATA15593 MILLS OF .3440 PANEL NO. 1
 SECOND SURVEY USING 4 WINDOWS OVER ENTIRE TRACE DIF. = 0.5309E-04

FFID

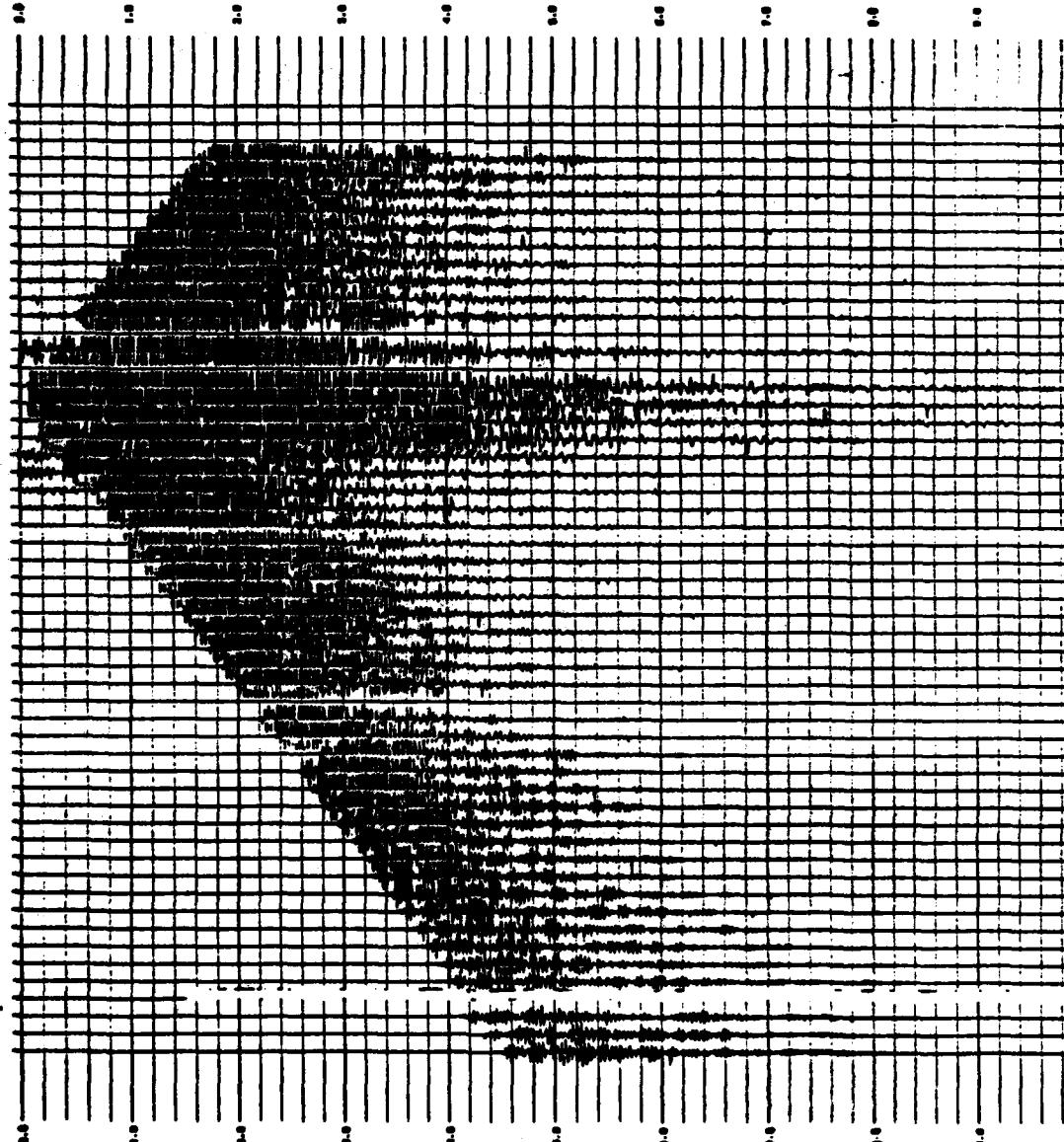
2801
 2802
 2803
 2804
 2805
 2806
 2807
 2808
 2809
 2810
 2811
 2812
 2813
 2814
 2815
 2816
 2817
 2818
 2819
 2820
 2821
 2822
 2823
 2824
 2825
 2826
 2827
 2828
 2829
 2830
 2831
 2832
 2833
 2834
 2835
 2836
 2837
 2838
 2839
 2840
 2841
 2842
 2843
 2844
 2845
 2846
 2847
 2848
 2849
 2850
 2851
 2852
 2853
 2854
 2855



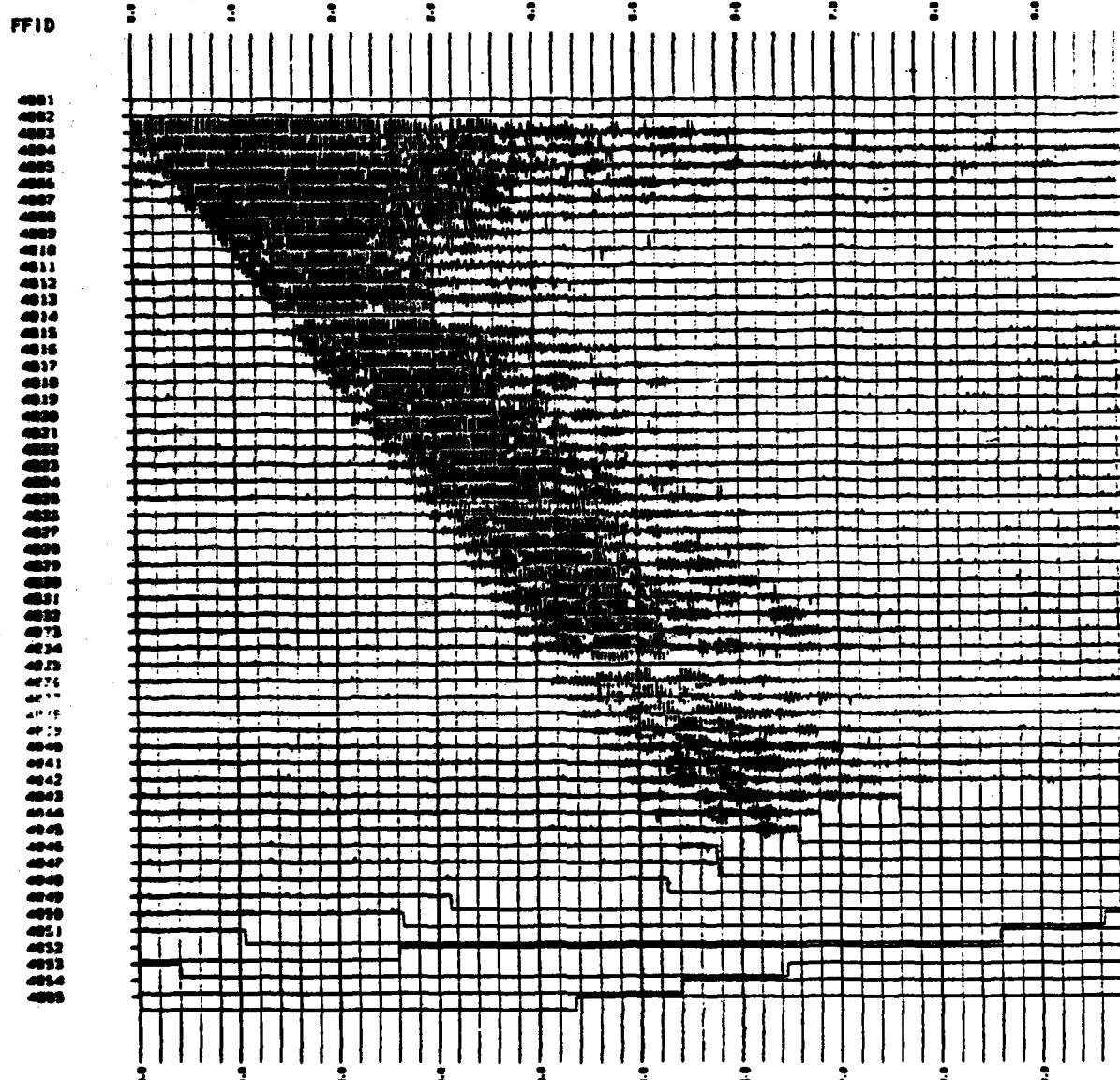
PROJECT : SICILY SICILY 22 000+ 2 TFS (UNFILT.ROT 01.7) SWING LINE 2
 21-090-1983 14:42:27.35 JOB NO. 7851
 POLARITY NORMAL - POSITIVE DATA15593 MILLS OF .3440 PANEL NO. 1
 SECOND SURVEY USING 4 WINDOWS OVER ENTIRE TRACE DIF. = 0.5309E-04

PROJECT : SICILY SICILY 22 OBS* 3 T FNC (UNFILT.RUT 01-7 KNNGD LINE 2
 21-APE-1963 14:45:22.06 JOB NO. 7883
 POLARITY NORMAL - POSITIVE DATA(59993 MILLS 07.344) PANEL NO. 1
 SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE REF. - 6.2381E+00

SE 10



PROJECT : SICILY SICILY 22 OBS: 4 TRAKUNFLT.ROT 01.7 SYNCH LINE 2
 21-APR-1983 14:48:54.06 JES NO. 7855
 POLARITY NORMAL - POSITIVE DATA(59992 MILS 07.344) PANEL NO. 1
 SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE REF. = 0.2332E+04

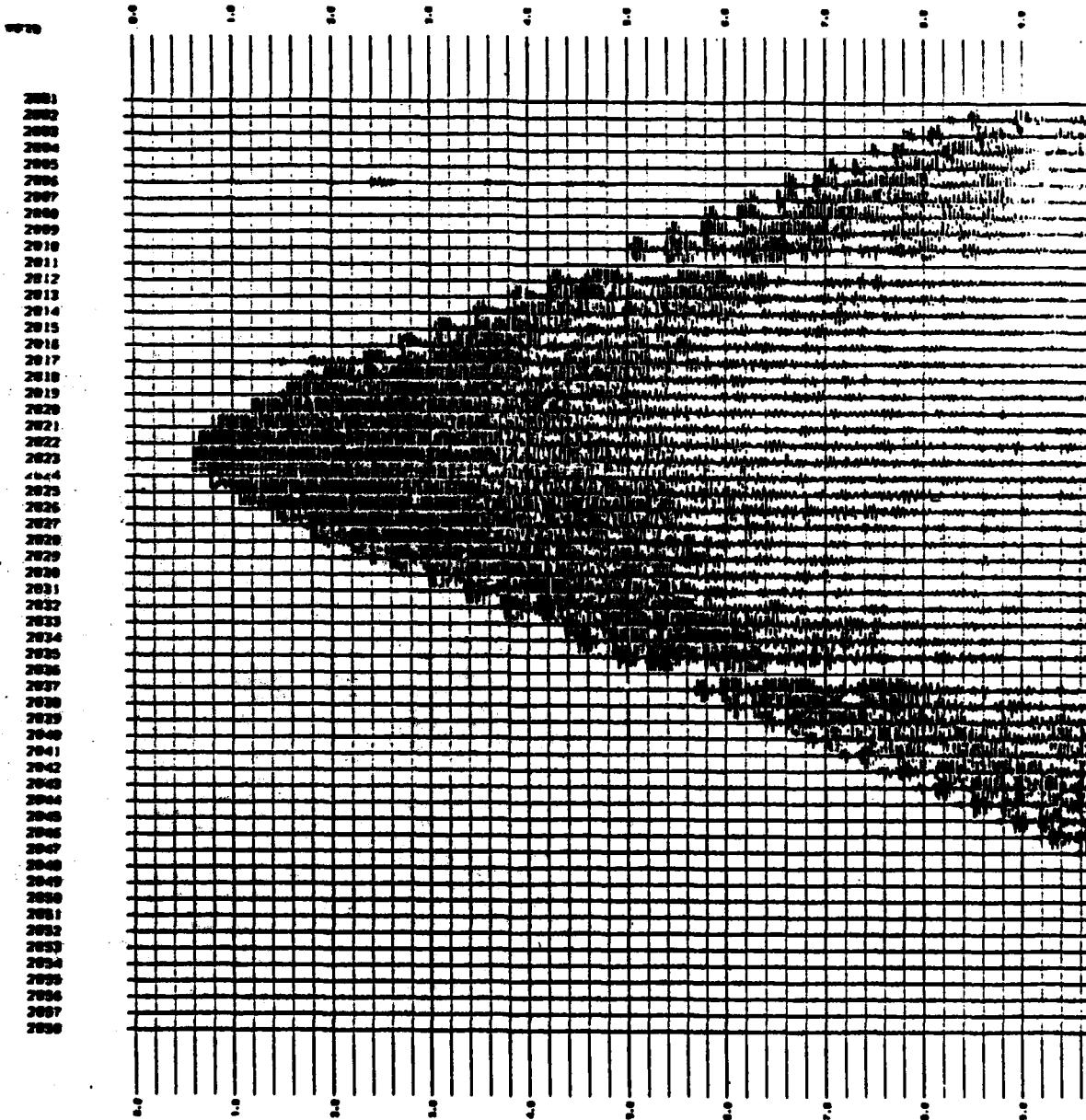


PROJECT : SICILY	SICILY 22 OBS: 4	TRAKUNFLT.ROT	01.7	SYNCH LINE	2
POLARITY	NORMAL	-	POSITIVE	DATA(59992	MILS 07.344)
REF.	0.2332E+04				

FORMAT : SICILY SICILY 21 08501 VERT(UNFILT.ROT 04.5 KM/SEC) LINE 1
20-APP-1963 09:25:23.40 JOB NO. 7665
POLARITY NORMAL - POSITIVE DATA(49997 MILLS 07.344) PANEL NO. 1
SECOND MASTERS USING 4 WIMBLES OVER ENTIRE TRACE REF. - 0.2191E+03

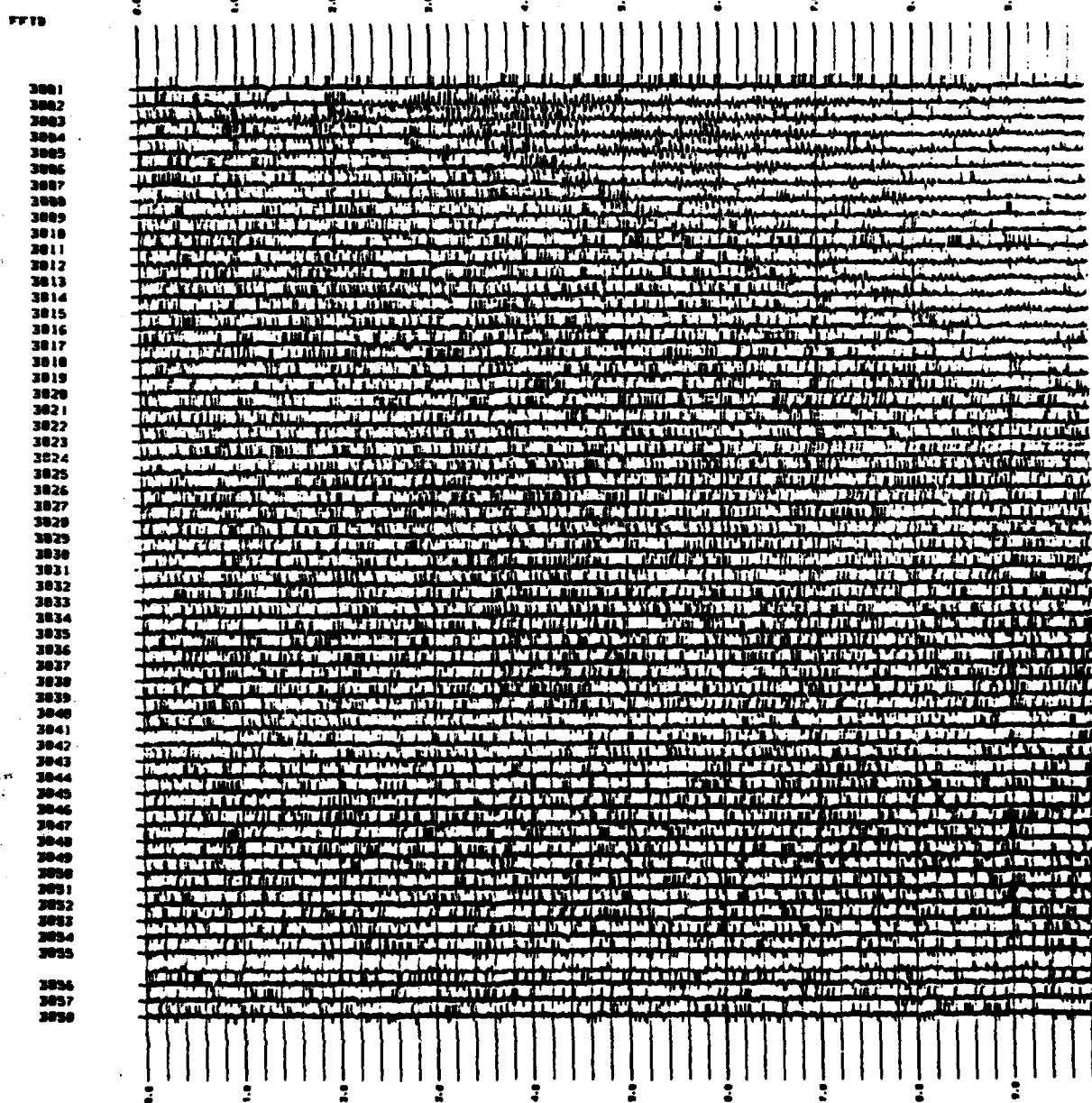
PROJECT : SICILY SITELY 21 SEPTEMBER 1943
POLARITY NORMAL -28° 00' 38.22" E. 40° 50' 00" N.
SECOND MEDIUM DISTANCE 391114999999 MILLS 87.3440
SECOND MEDIUM DISTANCE 401000000000 MILLS 87.3440
REF. - 0.121916-22

PROJECT : SICILY SICILY 21 QBS602 VERT/UNFLT.BOT 04.5 (K/M/SIC) LINE 1
 20-APR-1983 09:20:57.02 JOB NO. 7666
 POLARITY NORMAL - POSITIVE DATA(49997 MILLS 07.344) PANEL NO. 1
 SECOND AVERAGE USING 4 WINDING OVER ENTIRE TRACE REF. = 0.1788E+03



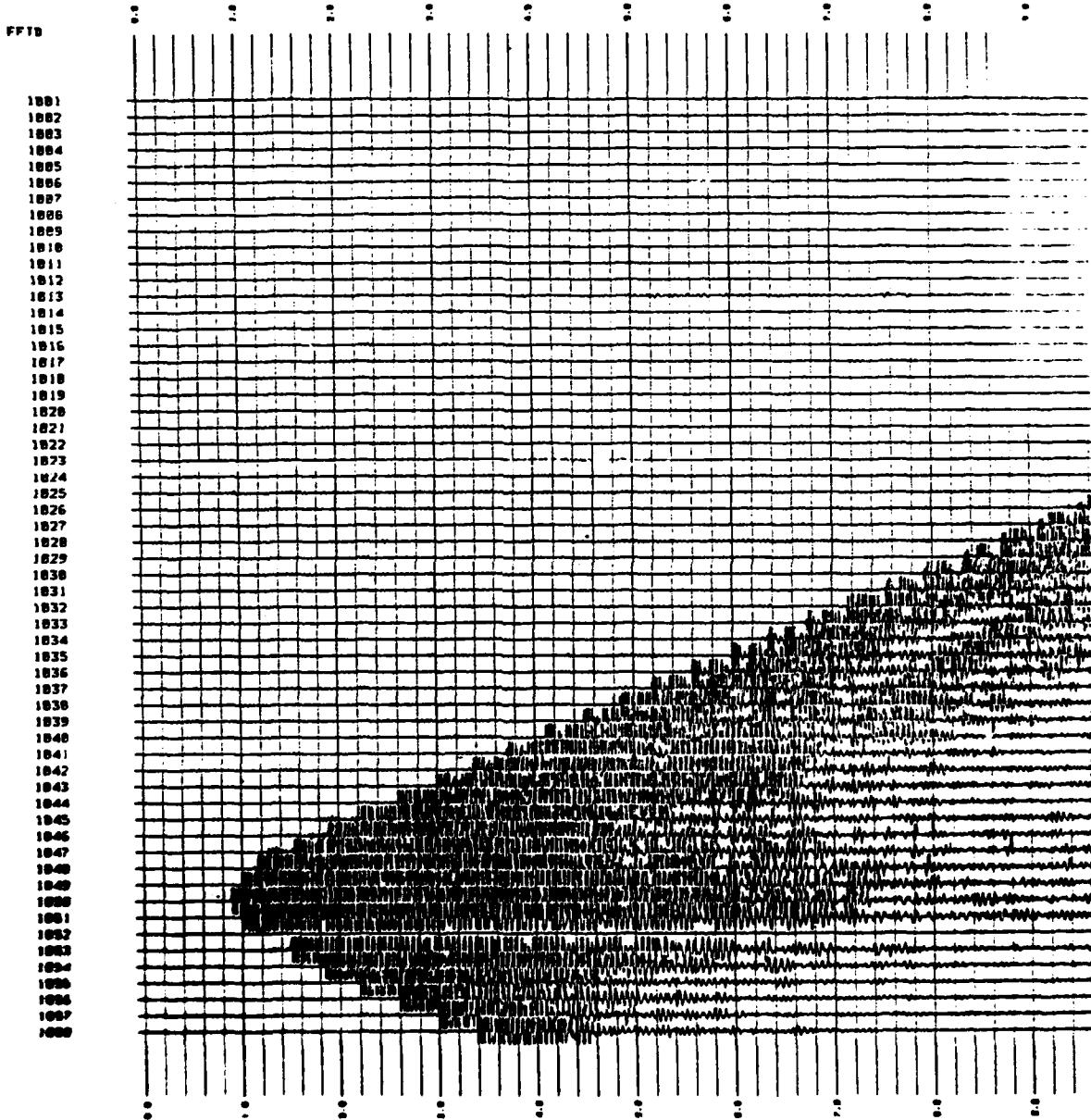
PROJECT : SICILY SICILY 21 QBS602 VERT/UNFLT.BOT 04.5 (K/M/SIC) LINE 1
 20-APR-1983 09:20:57.02 JOB NO. 7666
 POLARITY NORMAL - POSITIVE DATA(49997 MILLS 07.344) PANEL NO. 1
 SECOND AVERAGE USING 4 WINDING OVER ENTIRE TRACE REF. = 0.1788E+03

PROJECT : SICILY SICILY 21 OBS+3 VERT/UNFLT-BOT 94.5 KM/SIG LINE
 20-APR-1983 09:32:36.19 JOB NO. 7669
 POLARITY NORMAL - POSITIVE DATA(49997 MILLS 07.344) PANEL NO. 1
 SECOND AVERAGE USING 4 WINDOUS OVER ENTIRE TRACE REF. = B.5489E+03



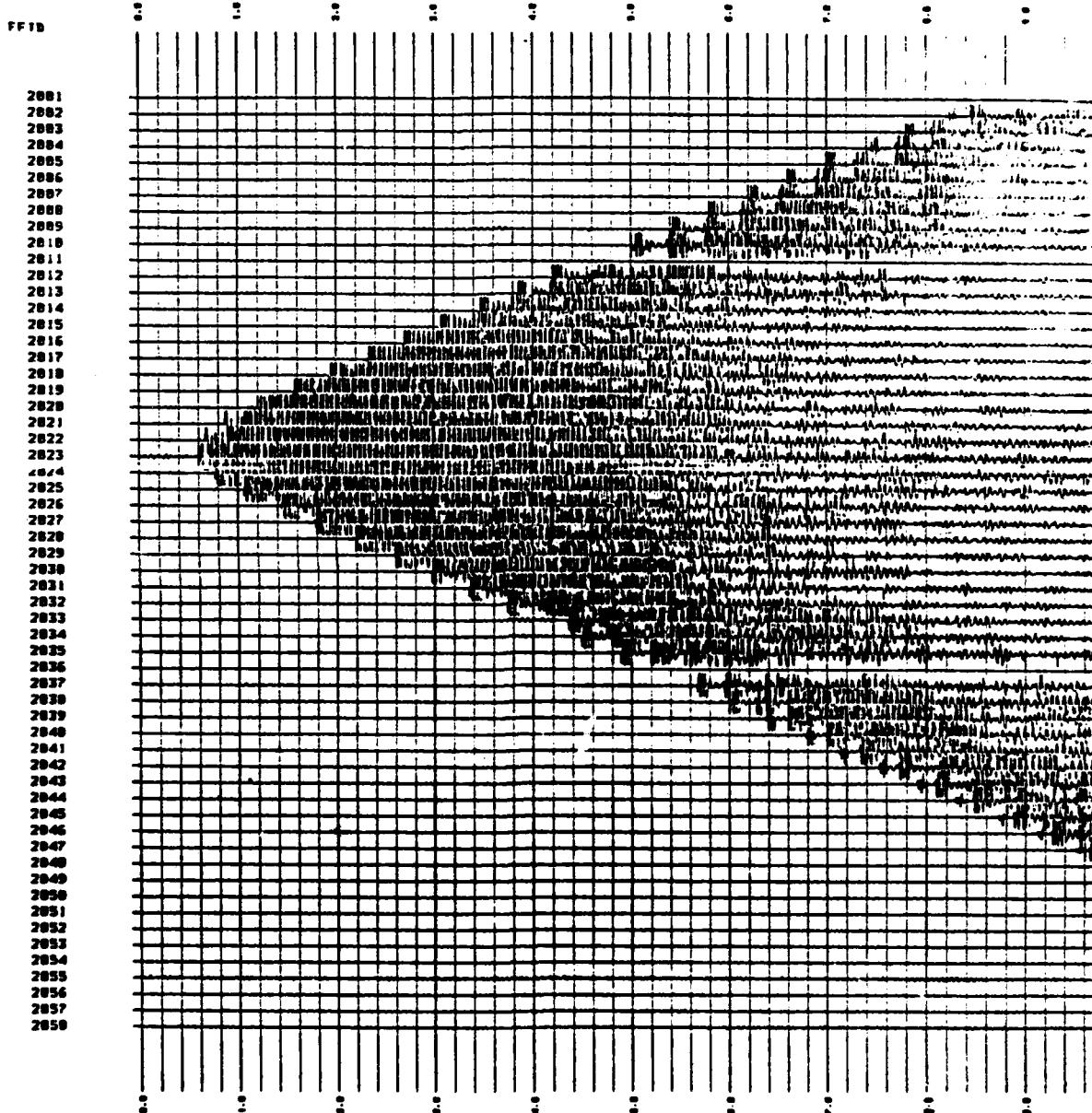
PROJECT : SICILY SICILY 21 OBS+3 VERT/UNFLT-BOT 94.5 KM/SIG LINE
 20-APR-1983 09:32:36.19 JOB NO. 7669
 POLARITY NORMAL - POSITIVE DATA(49997 MILLS 07.344) PANEL NO. 1
 SECOND AVERAGE USING 4 WINDOUS OVER ENTIRE TRACE REF. = B.5489E+03

PROJECT : SICILY SICILY 21 085+1 Rad (UNFILT.ROT @4.5 KM/SEC) LINE 1
 20-APP-1983 09:44:55.09 JDB NO. 7675
 POLARITY NORMAL - POSITIVE DATA(49997 MILLS @7.344) PANEL NO. 1
 SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE REF. = B.3979E+83



PROJECT : SICILY SICILY 21 085+1 Rad (UNFILT.ROT @4.5 KM/SEC) LINE 1
 20-APP-1983 09:44:55.09 JDB NO. 7675
 POLARITY NORMAL - POSITIVE DATA(49997 MILLS @7.344) PANEL NO. 1
 SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE

PROJECT : SICILY SICILY 21 DB5+2 Rad (UNFILT.ROT 84.5 KM/SEC) LINE 1
 28-APR-1983 09:47:48.78 JOB NO. 7676
 POLARITY NORMAL - POSITIVE DATA(49997 MILLS 07.344) PANEL NO. 1
 SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE REF. = 0.5448E+03

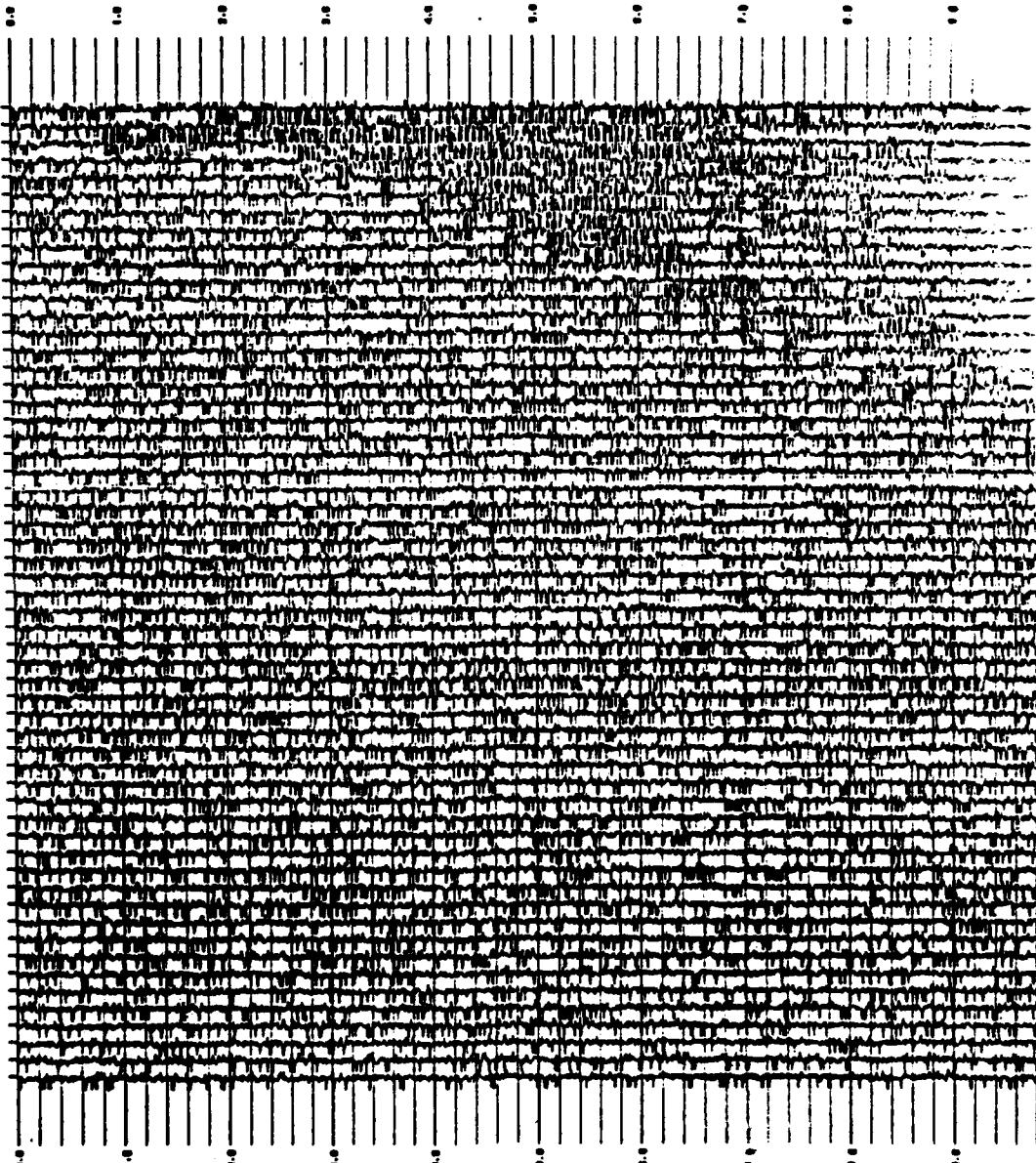


SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE REF. = 0.5448E+03
 POLARITY NORMAL - POSITIVE DATA(49997 MILLS 07.344) PANEL NO. 1
 JOB NO. 7676
 PROJECT : SICILY SICILY 21 DB5+2 Rad (UNFILT.ROT 84.5 KM/SEC) LINE 1

PROJECT : SICILY SICILY 21 08503 Rad (UNFILT.ROT 84.5 KM/SEC) LINE 1
 20-APP-1983 09:58:17.64 JOB NO. 7677
 POLARITY NORMAL - POSITIVE DATA(49997 MILLS 07.344) PANEL NO. 1
 SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE REF. - 0.6360E+00

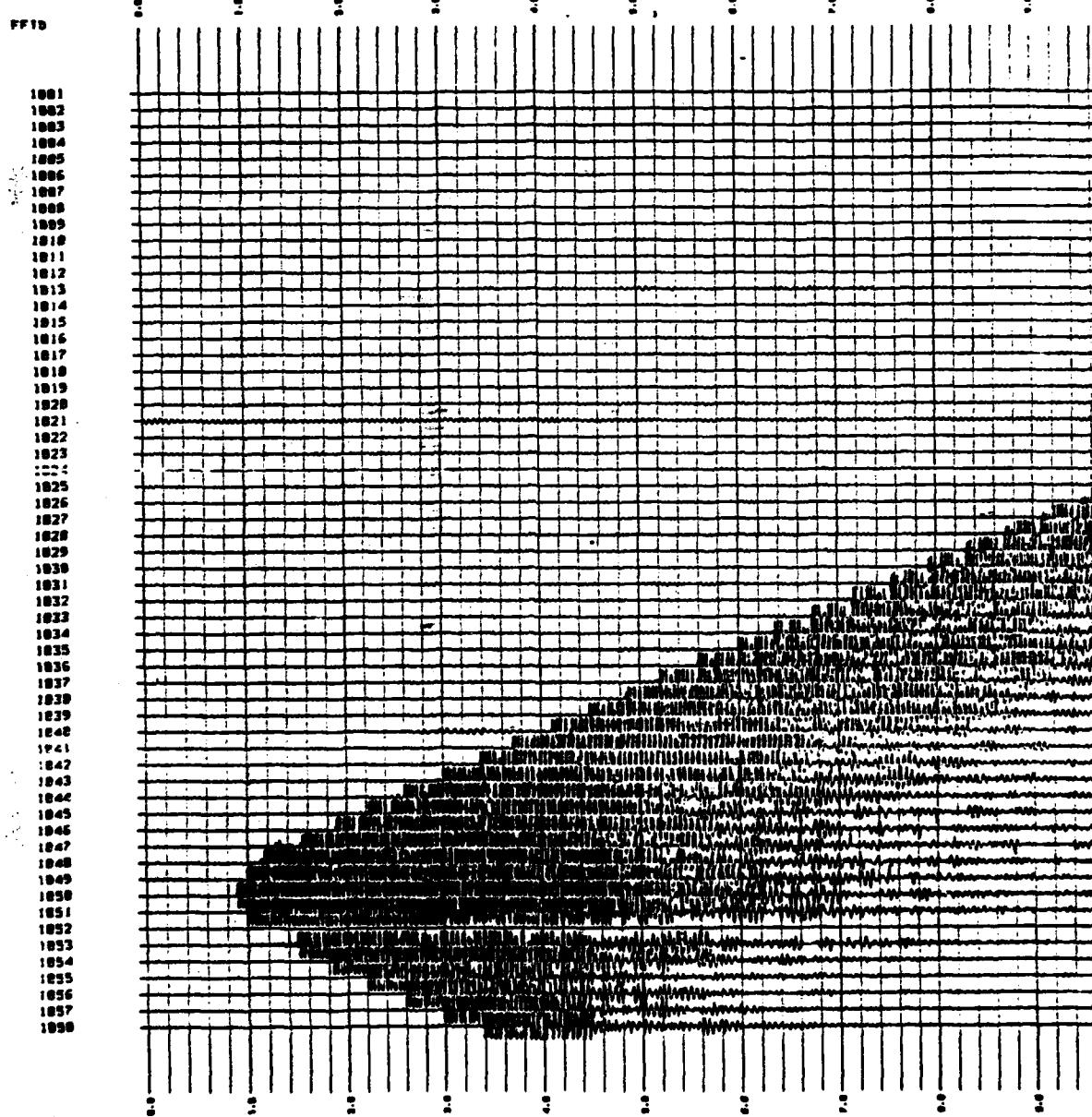
PPFD

3001
 3002
 3003
 3004
 3005
 3006
 3007
 3008
 3009
 3010
 3011
 3012
 3013
 3014
 3015
 3016
 3017
 3018
 3019
 3020
 3021
 3022
 3023
 3024
 3025
 3026
 3027
 3028
 3029
 3030
 3031
 3032
 3033
 3034
 3035
 3036
 3037
 3038
 3039
 3040
 3041
 3042
 3043
 3044
 3045
 3046
 3047
 3048
 3049
 3050
 3051
 3052
 3053
 3054
 3055
 3056
 3057
 3058



PROJECT : SICILY SICILY 21 08503 Rad (UNFILT.ROT 84.5 KM/SEC) LINE 1
 20-APP-1983 09:58:17.64 JOB NO. 7677
 POLARITY NORMAL - POSITIVE DATA(49997 MILLS 07.344) PANEL NO. 1
 SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE REF. - 0.6360E+00

PROJECT : SICILY SICILY 21 DBS01 TFSUNFILT.ROT 84.3 KM/SEC LINE 1
 20-APR-1983 09:36:31-28 JOB NO. 7672
 POLARITY NORMAL - POSITIVE DATA(49997 MILLS 07.344) PANEL NO. 1
 SECOND OVERAGE USING 4 WINDINGS OVER ENTIRE TRACE REF. = 8.4921E+03

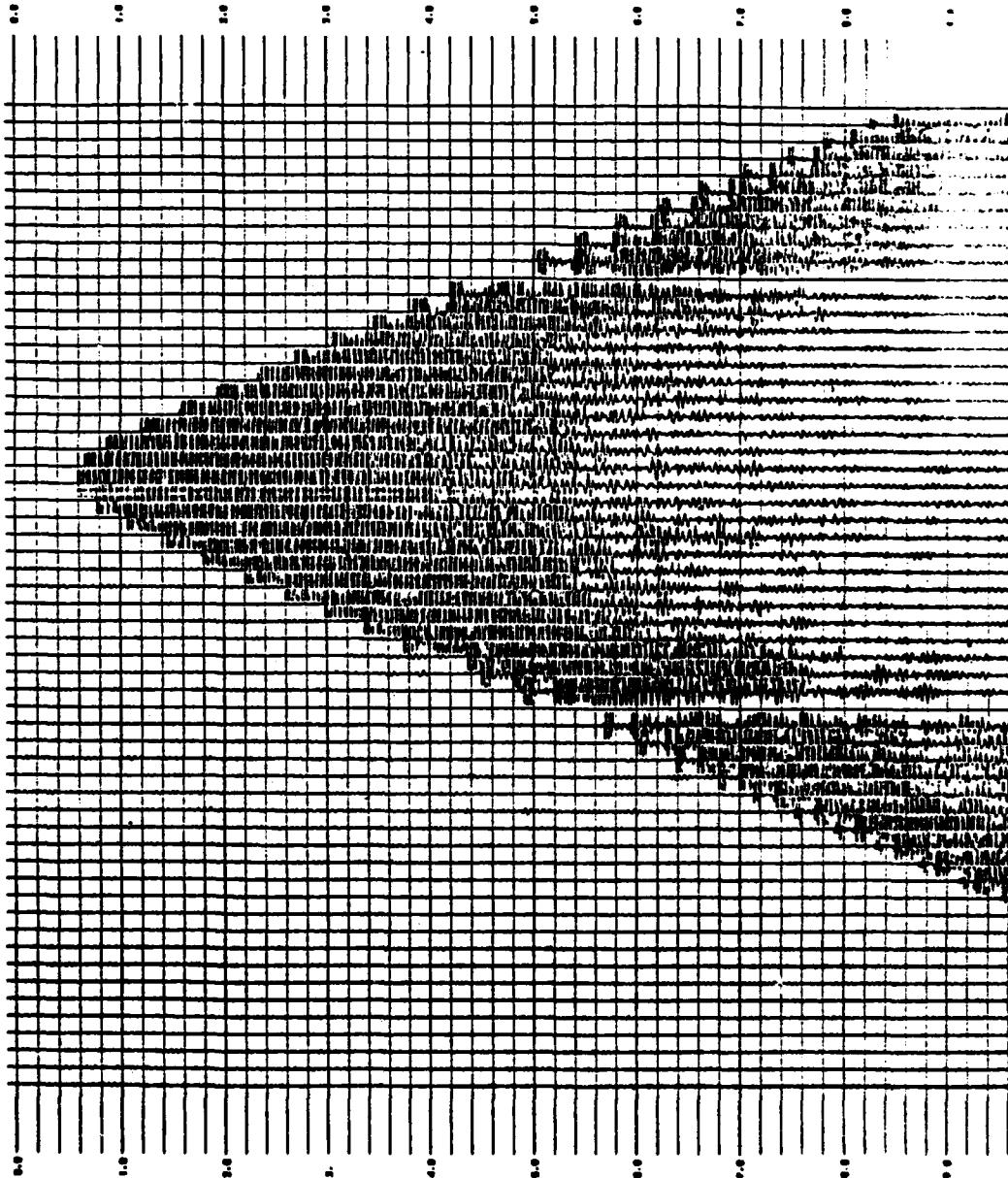


SECOND OVERAGE USING 4 WINDINGS OVER ENTIRE TRACE REF. = 8.4921E+03
 POLARITY NORMAL - POSITIVE DATA(49997 MILLS 07.344) PANEL NO. 1
 20-APR-1983 09:36:31-28 JOB NO. 7672
 PROJECT : SICILY SICILY 21 DBS01 TFSUNFILT.ROT 84.3 KM/SEC LINE 1

PROJECT : SICILY SICILY 21 DB502 Trg (UNFILTERED ROT 84.5 KM/SEC) LINE 1
 20-APR-1983 09:39:22.84 JOB NO. 7673
 POLARITY NORMAL - POSITIVE DATA(49997 MILLS 07.344) PANEL NO. 1
 SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE REF. = 0.0466E+03

FF19

2001
 2002
 2003
 2004
 2005
 2006
 2007
 2008
 2009
 2010
 2011
 2012
 2013
 2014
 2015
 2016
 2017
 2018
 2019
 2020
 2021
 2022
 2023
 2024
 2025
 2026
 2027
 2028
 2029
 2030
 2031
 2032
 2033
 2034
 2035
 2036
 2037
 2038
 2039
 2040
 2041
 2042
 2043
 2044
 2045
 2046
 2047
 2048
 2049
 2050
 2051
 2052
 2053
 2054
 2055
 2056
 2057
 2058

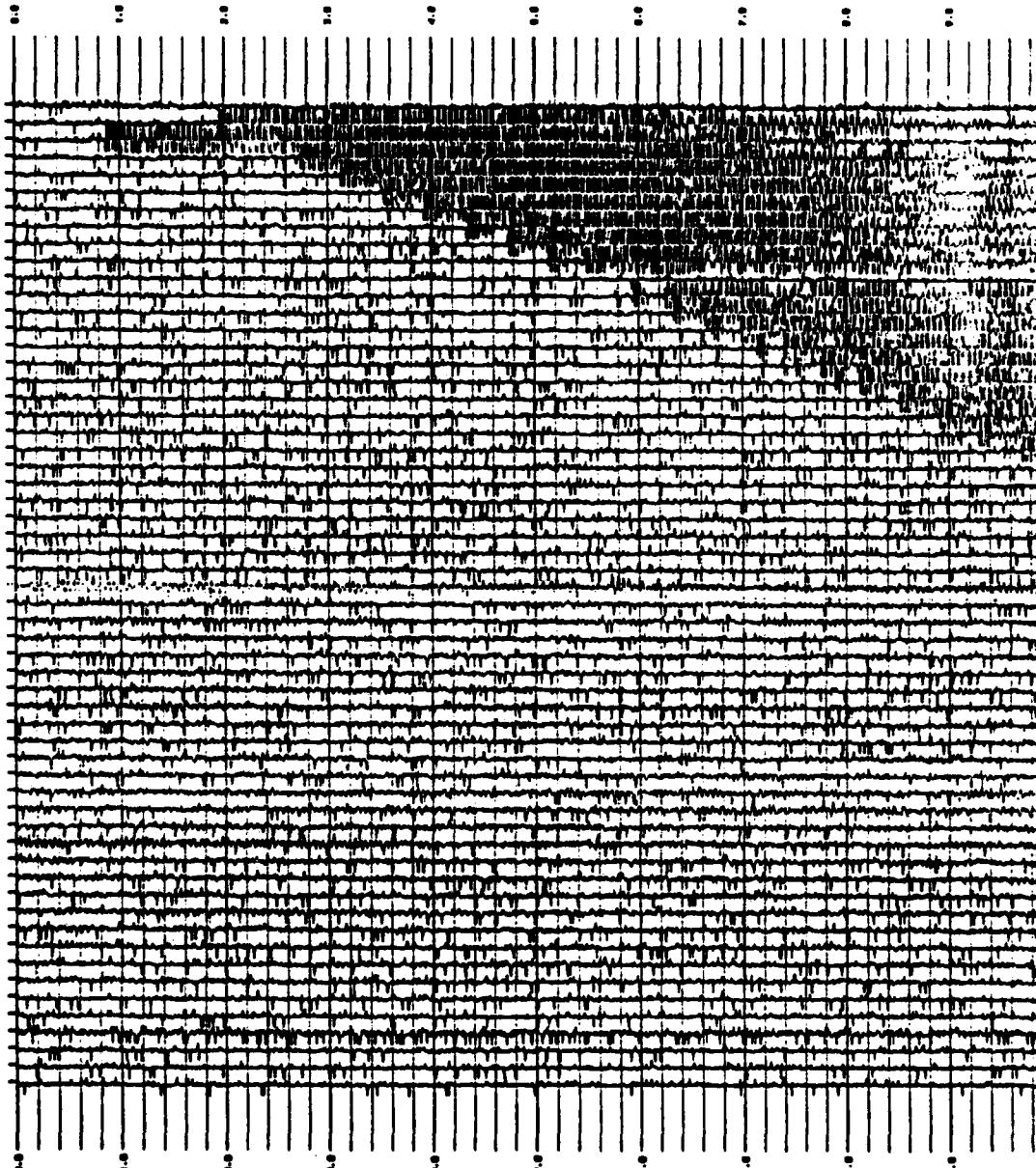


PROJECT : SICILY SICILY 21 DB502 Trg (UNFILTERED ROT 84.5 KM/SEC) LINE 1
 20-APR-1983 09:39:22.84 JOB NO. 7673
 POLARITY NORMAL - POSITIVE DATA(49997 MILLS 07.344) PANEL NO. 1
 SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE REF. = 0.0466E+03

PROJECT : SICILY SICILY 21 085e3TPA (UNFILT.BOT 94.5 KM/SEC) LINE 1
 29-APR-1983 09:41:59.89 JOB NO. 7674
 POLARITY NORMAL - POSITIVE DATA(49997 MILLS 07.344) PANEL NO. 1
 SECOND AVERAGE USING 4 UNIDIM DIVER ENTIRE TRACE REF. = 8.5874E+03

FFID

3801
3802
3803
3804
3805
3806
3807
3808
3809
3810
3811
3812
3813
3814
3815
3816
3817
3818
3819
3820
3821
3822
3823
3824
3825
3826
3827
3828
3829
3830
3831
3832
3833
3834
3835
3836
3837
3838
3839
3840
3841
3842
3843
3844
3845
3846
3847
3848
3849
3850
3851
3852
3853
3854
3855
3856
3857
3858

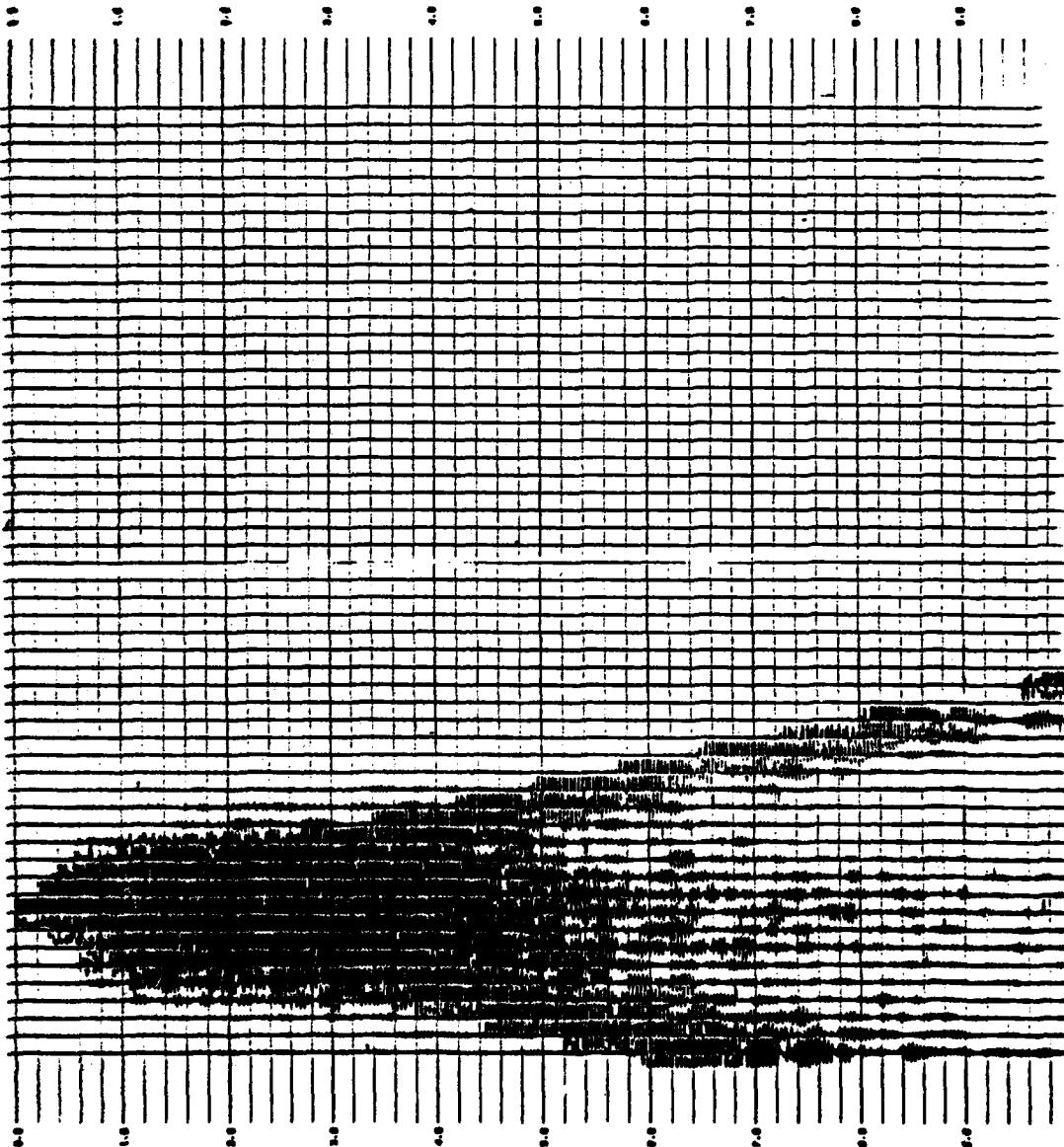


PROJECT : SICILY SICILY 21 085e3TPA (UNFILT.BOT 94.5 KM/SEC) LINE 1
 29-APR-1983 09:41:59.89 JOB NO. 7674
 POLARITY NORMAL - POSITIVE DATA(49997 MILLS 07.344) PANEL NO. 1
 SECOND AVERAGE USING 4 UNIDIM DIVER ENTIRE TRACE REF. = 8.5874E+03

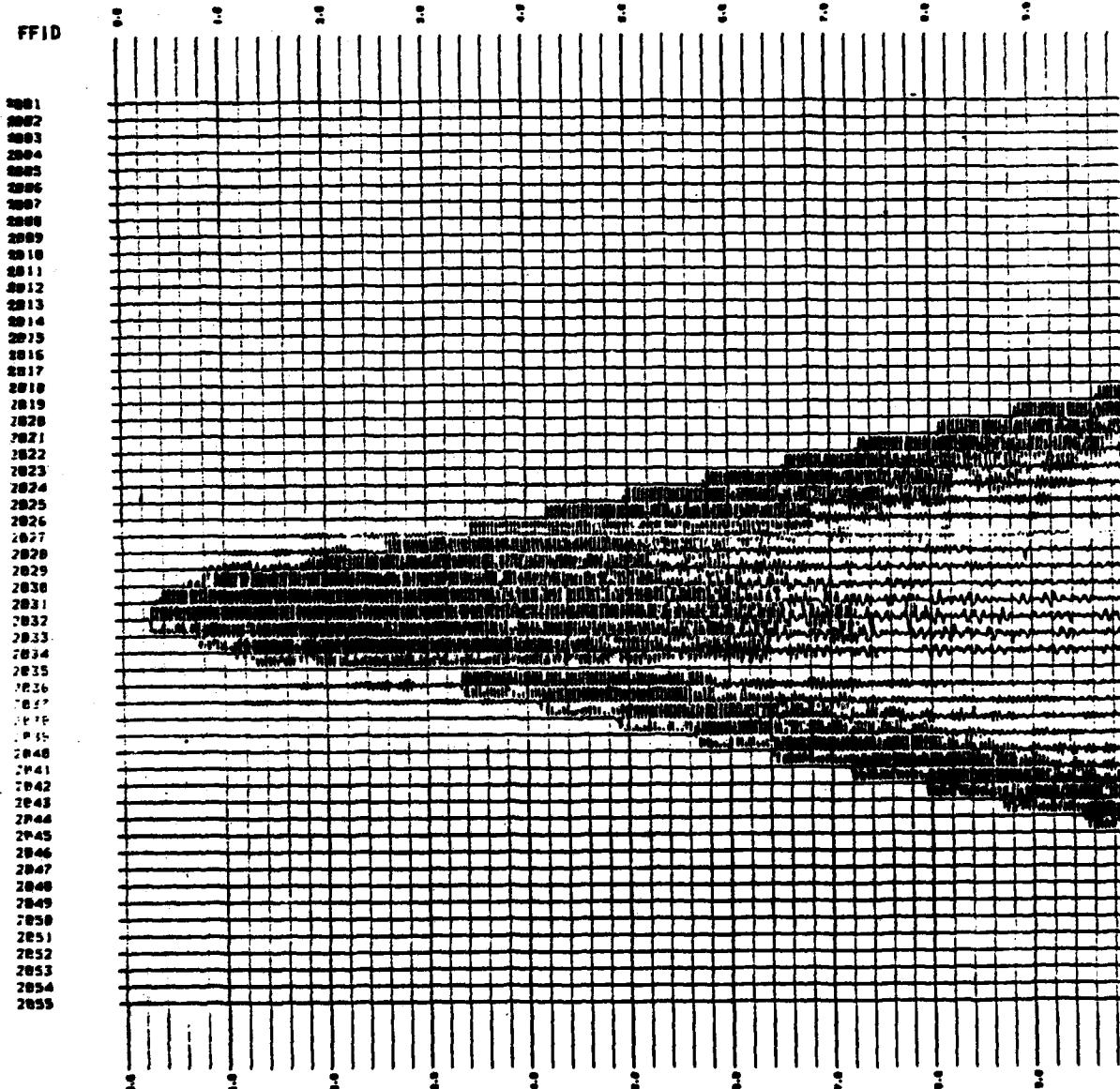
PROJECT : SICILY SICILY 22 OBSOI VERTUNFILT.ROT 84.5 KM/SEC) LINE 2
 20-098-1983 18:42:48.93 JOB NO. 7683
 POLARITY NORMAL - POSITIVE DATA(35993 MILLS 87.344) PANEL NO. 1
 SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE REF. = 8.6922E+03

FF10

1001
 1002
 1003
 1004
 1005
 1006
 1007
 1008
 1009
 1010
 1011
 1012
 1013
 1014
 1015
 1016
 1017
 1018
 1019
 1020
 1021
 1022
 1023
 1024
 1025
 1026
 1027
 1028
 1029
 1030
 1031
 1032
 1033
 1034
 1035
 1036
 1037
 1038
 1039
 1040
 1041
 1042
 1043
 1044
 1045
 1046
 1047
 1048
 1049
 1050
 1051
 1052
 1053
 1054
 1055



PROJECT : SICILY SICILY 22 08842 VERT(UNFILT,ROT 84.5 KM/SEC) LINE 2
 28-APR-1983 18:45:34.44 JOB NO. 7684
 POLARITY NORMAL - POSITIVE DATA(55593 MILLS 07.344) PANEL NO. 1
 SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE REF. = 0.8793E+03

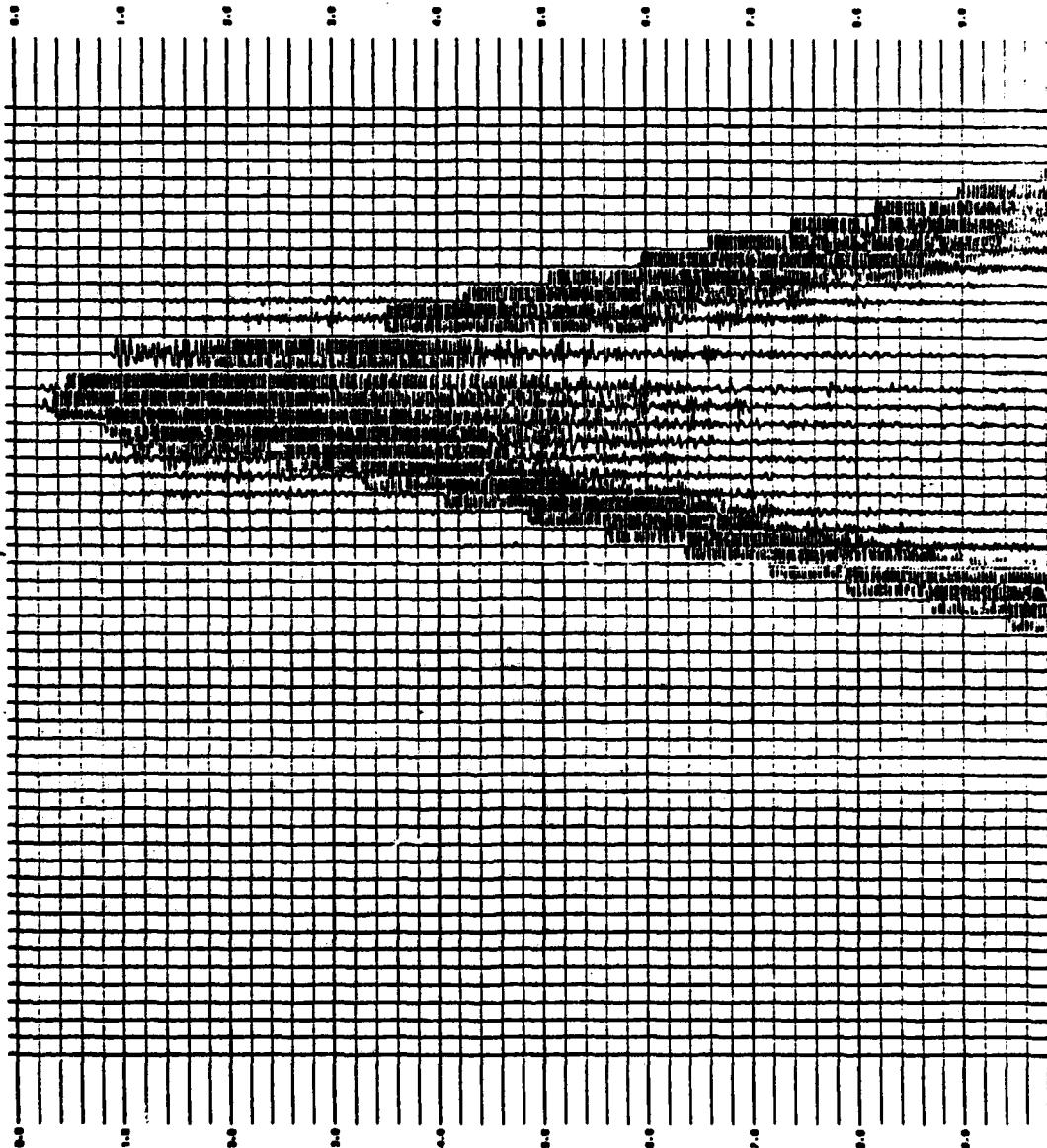


PROJECT : SICILY SICILY 22 08842 VERT(UNFILT,ROT 84.5 KM/SEC) LINE 2
 28-APR-1983 18:45:34.44 JOB NO. 7684
 POLARITY NORMAL - POSITIVE DATA(55593 MILLS 07.344) PANEL NO. 1
 SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE REF. = 0.8793E+03

PROJECT : SICILY SICILY 22 DBS+3 WERTCUMFILT.RDT 94.5 KM/SEC) LINE 2
 28-APR-1983 10:48:18.28 JOB NO. 7685
 POLARITY NORMAL - POSITIVE DATA(59993 MILLS 87.344) PANEL NO. 1
 SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE REF. - 8.2688E+83

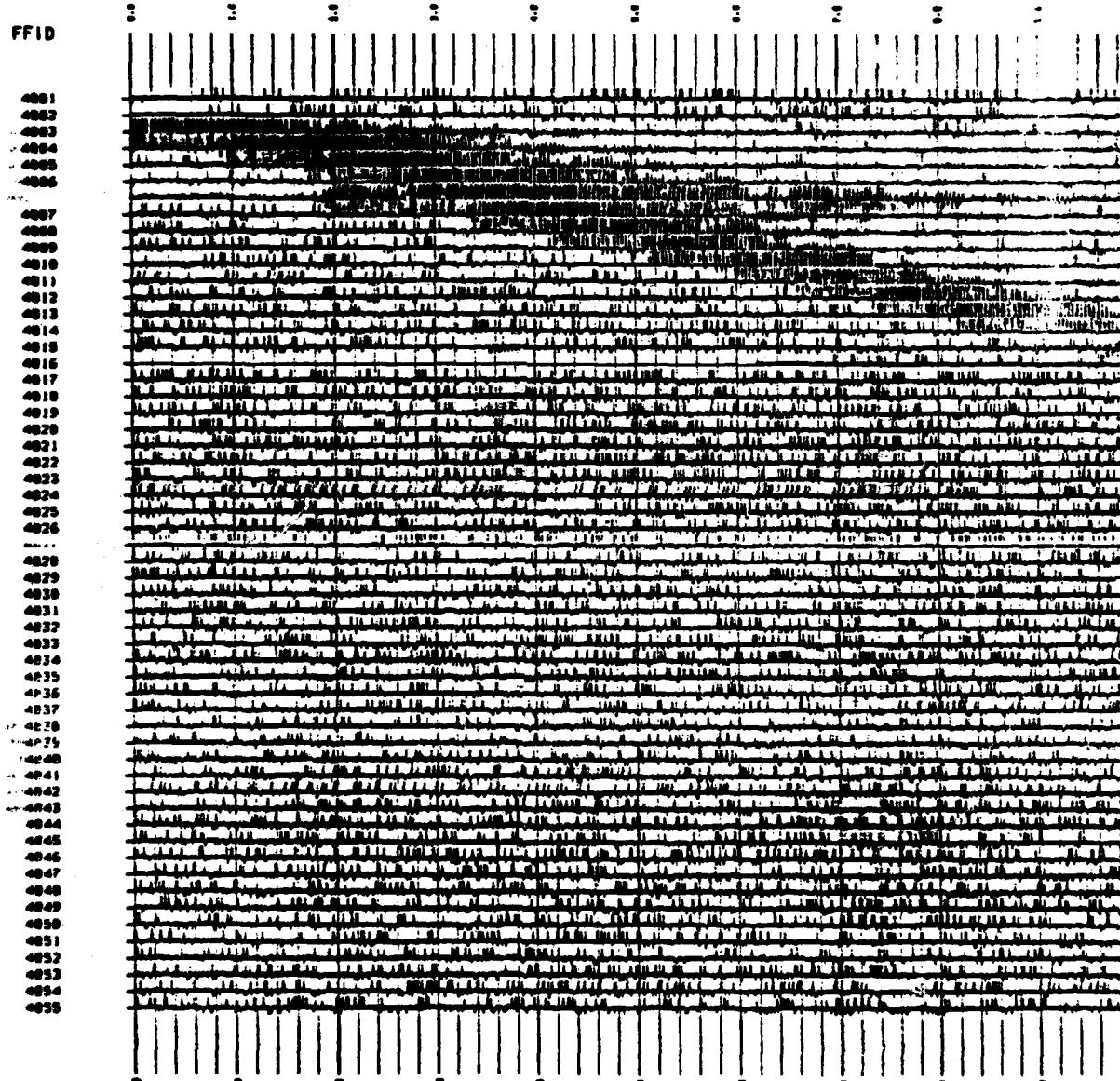
FFID

3881
 3882
 3883
 3884
 3885
 3886
 3887
 3888
 3889
 3890
 3891
 3892
 3893
 3894
 3895
 3896
 3897
 3898
 3899
 3900
 3901
 3902
 3903
 3904
 3905
 3906
 3907
 3908
 3909
 3910
 3911
 3912
 3913
 3914
 3915
 3916
 3917
 3918
 3919
 3920
 3921
 3922
 3923
 3924
 3925
 3926
 3927
 3928
 3929
 3930
 3931
 3932
 3933
 3934
 3935
 3936
 3937
 3938
 3939
 3940
 3941
 3942
 3943
 3944
 3945
 3946
 3947
 3948
 3949
 3950
 3951
 3952
 3953
 3954
 3955



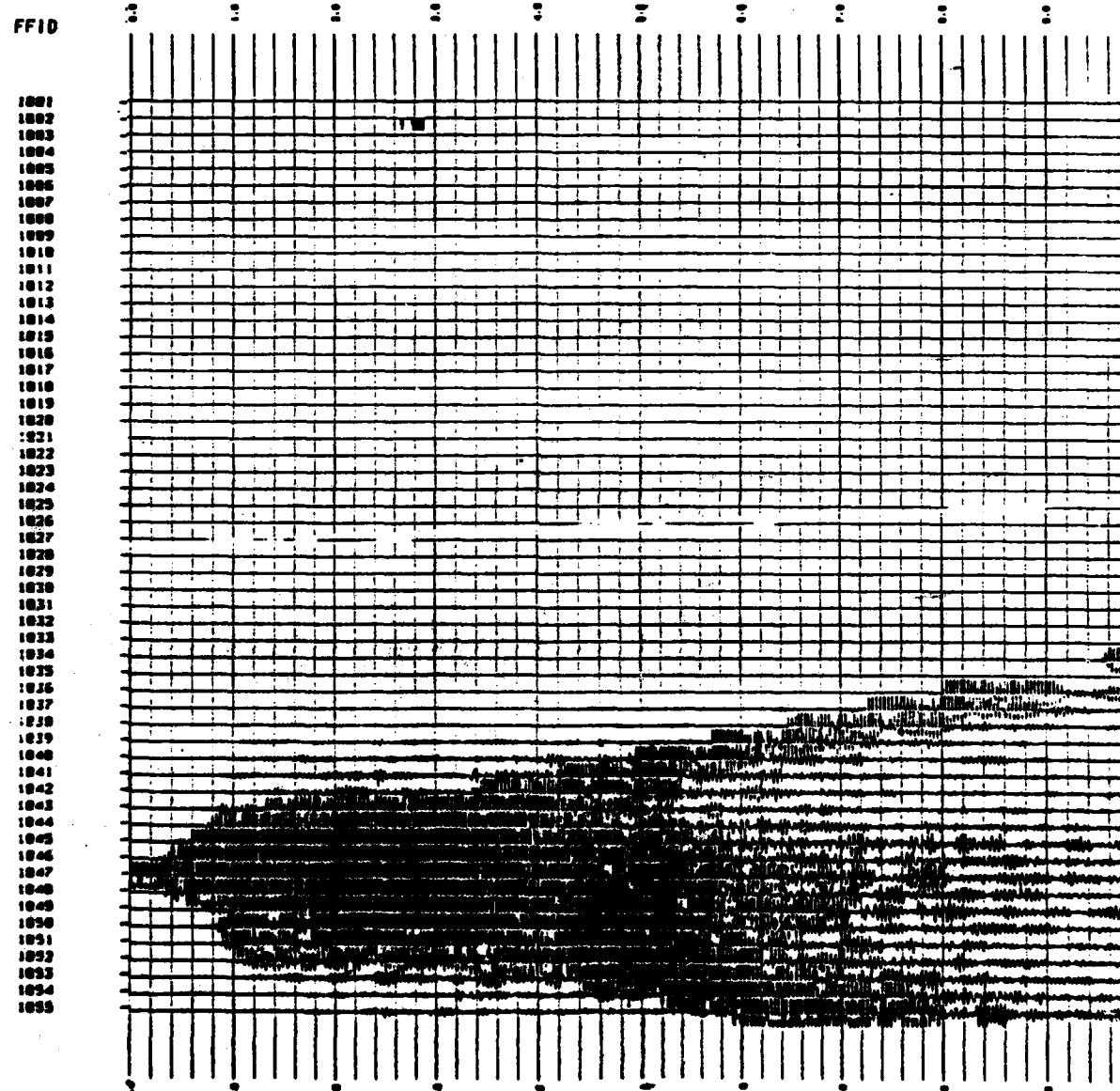
PROJECT : SICILY SICILY 22 DBS+3 WERTCUMFILT.RDT 94.5 KM/SEC) LINE 2
 28-APR-1983 10:48:18.28 JOB NO. 7685
 POLARITY NORMAL - POSITIVE DATA(59993 MILLS 87.344) PANEL NO. 1
 SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE REF. - 8.2688E+83

PROJECT : SICILY SICILY 22 OBS+4 VERTUNFILT.ROT 94.5 KM/SEC LINE 2
 29-APR-1983 10:58:52.89 JOB NO. 7586
 POLARITY NORMAL - POSITIVE DATA(59993 MILLS 87.344) PANEL NO. 1
 SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE REF. = 0.6871E+03



SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE
 POLARITY NORMAL - POSITIVE DATA(59993 MILLS 87.344) PANEL NO. 1
 REF. = 0.6871E+03

PROJECT : SICILY SICILY 22 085+1 Rad (UNFILT.ROT 94.9 ENDS) LINE 2
 28-APR-1983 14:43:54.83 JIB NO. 7759
 POLARITY NORMAL - POSITIVE DATA(55555555 MILLS OF 3000) PANEL NO. 1
 USER SUPPLIED REFERENCE VALUE REF. = 0.2488E+04

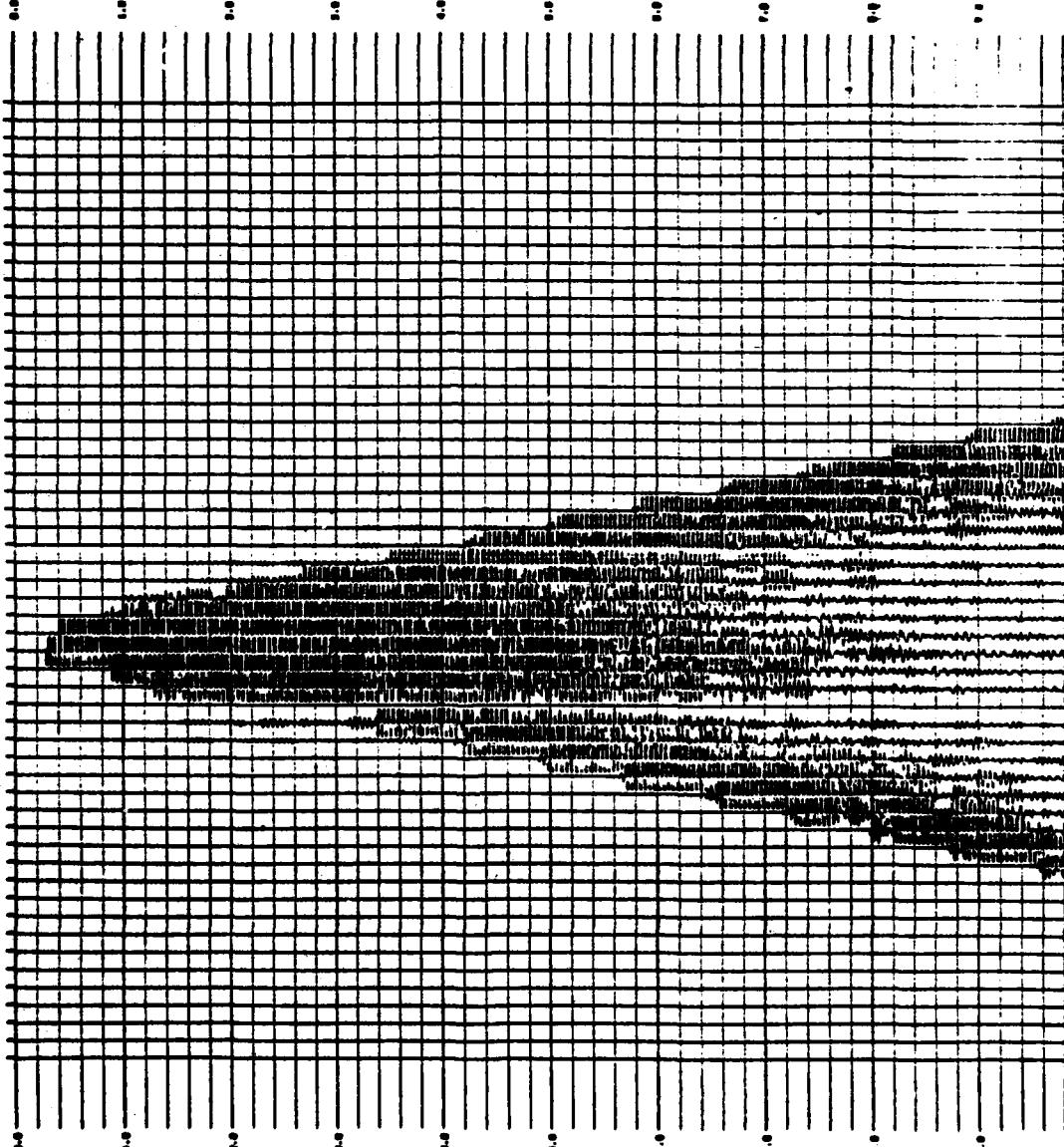


PROJECT : SICILY SICILY 22 085+1 Rad (UNFILT.ROT 94.9 ENDS) LINE 2
 28-APR-1983 14:43:54.83 JIB NO. 7759
 POLARITY NORMAL - POSITIVE DATA(55555555 MILLS OF 3000) PANEL NO. 1
 USER SUPPLIED REFERENCE VALUE REF. = 0.2488E+04

PROJECT : SICILY SICILY 22 OBS+2 Rad (UNFILT.ROT 94.5 KNUSED LINE 2
 20-APR-1983 11:07:49.68 JOB NO. 7692
 POLARITY NORMAL - POSITIVE DATA(S9993 MILLS 07.344) PWRCL NO. 1
 SECOND AVERAGE USING 4 WINBOTS OVER ENTIRE TRACE REF. - 0.2744E+04

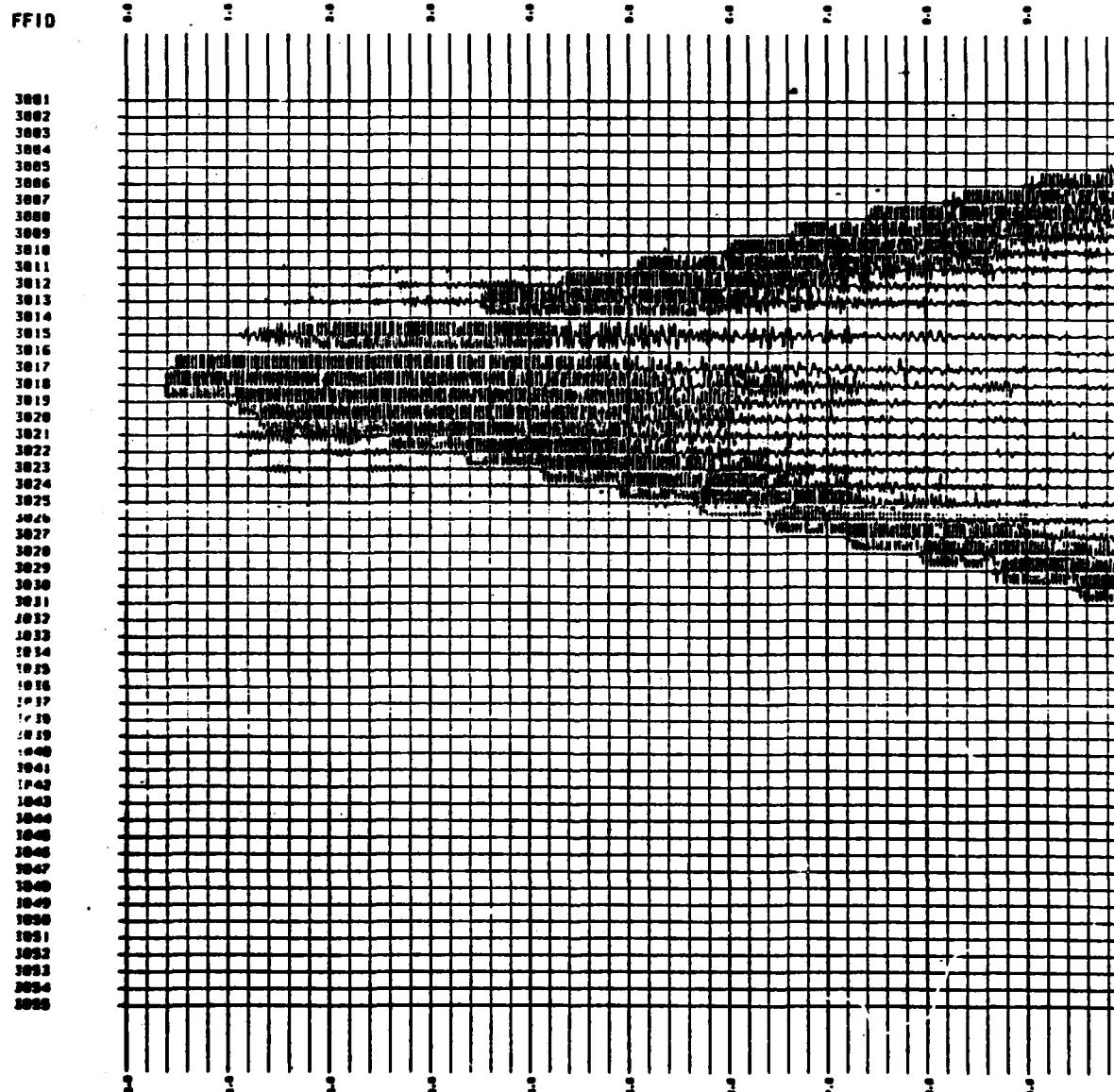
FFID

2801
 2802
 2803
 2804
 2805
 2806
 2807
 2808
 2809
 2810
 2811
 2812
 2813
 2814
 2815
 2816
 2817
 2818
 2819
 2820
 2821
 2822
 2823
 2824
 2825
 2826
 2827
 2828
 2829
 2830
 2831
 2832
 2833
 2834
 2835
 2836
 2837
 2838
 2839
 2840
 2841
 2842
 2843
 2844
 2845
 2846
 2847
 2848
 2849
 2850
 2851
 2852
 2853
 2854
 2855



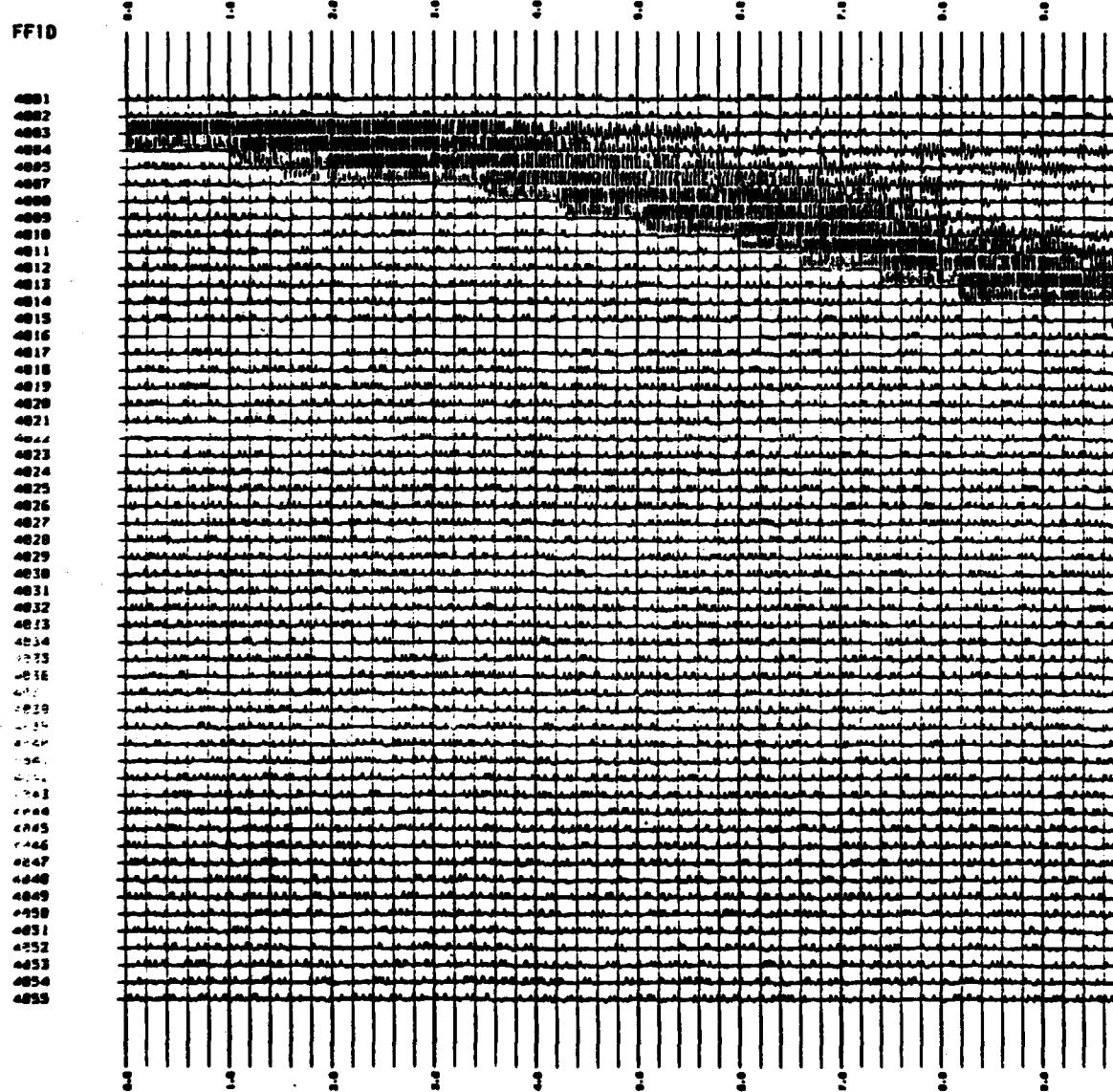
PROJECT : SICILY SICILY 22 OBS+2 Rad (UNFILT.ROT 94.5 KNUSED LINE 2
 20-APR-1983 11:07:49.68 JOB NO. 7692
 POLARITY NORMAL - POSITIVE DATA(S9993 MILLS 07.344) PWRCL NO. 1
 SECOND AVERAGE USING 4 WINBOTS OVER ENTIRE TRACE REF. - 0.2744E+04

PROJECT : SICILY SICILY 22 08503 Rad (UNFILT.ROT 04.5 KW34) LINE 2
 28-APR-1983 11:10:22.03 JOB NO. 7693
 POLARITY NORMAL - POSITIVE DATA(S9993 MILLS 07.344) PANEL NO. 1
 SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE REF. - 0.1929E+04



SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE REF. - 0.1929E+04
 POLARITY NORMAL - POSITIVE DATA(S9993 MILLS 07.344) PANEL NO. 1
 28-APR-1983 11:10:22.03 JOB NO. 7693
 PROJECT : SICILY SICILY 22 08503 Rad (UNFILT.ROT 04.5 KW34) LINE 2

PROJECT : SICILY SICILY 22 OBS+4 Rad (UNFILT.ROT 84.5 KM/SEC LINE 2
 28-APR-1983 11:12:36.63 JOB NO. 7694
 POLARITY NORMAL - POSITIVE DATA(99993 MILLS 07.344) PANEL NO. 1
 SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE REF. = 0.1458E+04



PROJECT : SICILY SICILY 22 OBS+4 Rad (UNFILT.ROT 84.5 KM/SEC LINE 2
 28-APR-1983 11:12:36.63 JOB NO. 7694
 POLARITY NORMAL - POSITIVE DATA(99993 MILLS 07.344) PANEL NO. 1
 SECONDS AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE REF. = 0.1458E+04

AD-A135 484 WAVE PROPAGATION STUDY OF THE CENTRAL MEDITERRANEAN SEA 2/2
USING OCEAN BOTTOM (U) TEXAS UNIV AT AUSTIN INST FOR
GEOPHYSICS W P O'BRIEN ET AL. 01 NOV 83 CONTRIB-575

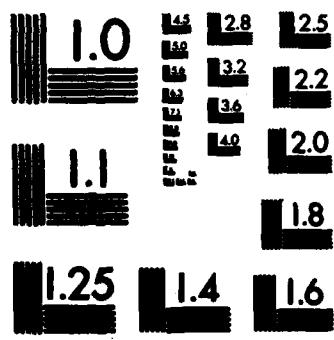
UNCLASSIFIED

N00014-77-C-0606

F/G 8/11

NL



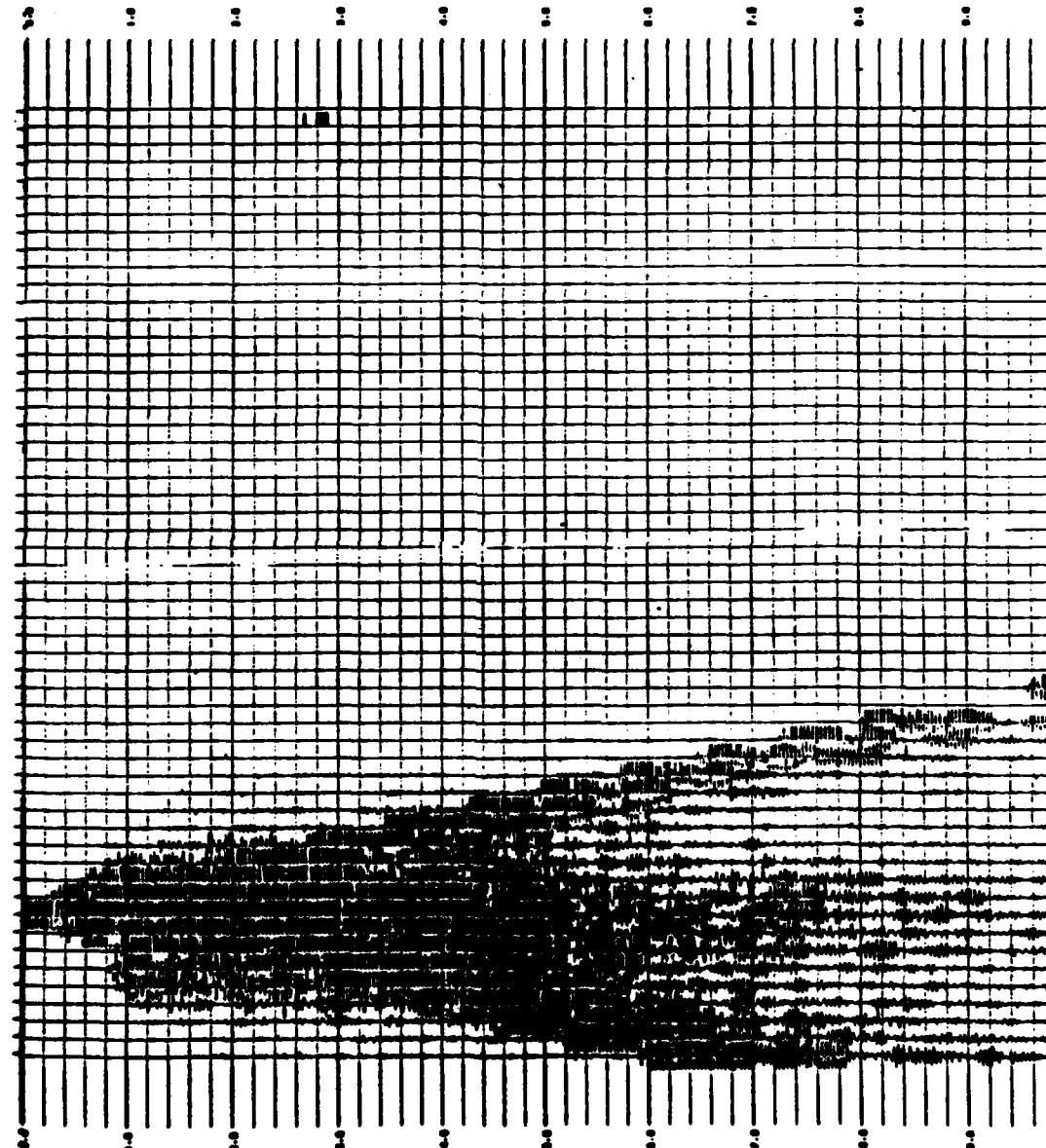


MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

PROJECT : SICILY	SICILY 22 0001 Traumfilt.ROT 04.5 KR/SEC LINE	2
	20-APR-1963 14:46:51.00	JOB NO. 7751
POLARITY NORMAL - POSITIVE	DATA(59993 MILLS 07.344)	PANEL NO. 1
USER SUPPLIED REFERENCE VALUE		REF. = 0.24000+04

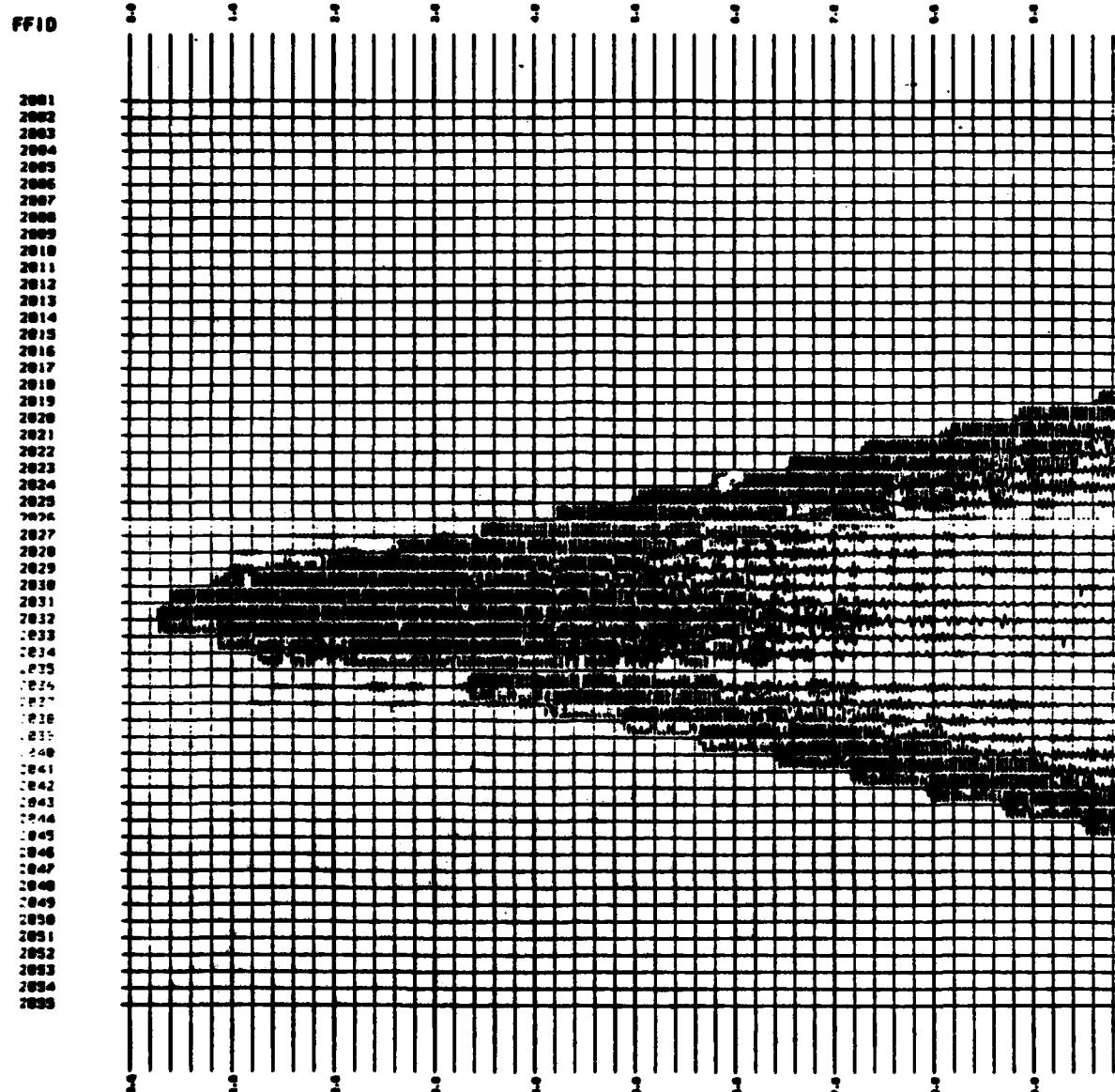
FF10

1001
1002
1003
1004
1005
1006
1007
1008
1009
1010
1011
1012
1013
1014
1015
1016
1017
1018
1019
1020
1021
1022
1023
1024
1025
1026
1027
1028
1029
1030
1031
1032
1033
1034
1035
1036
1037
1038
1039
1040
1041
1042
1043
1044
1045
1046
1047
1048
1049
1050
1051
1052
1053
1054
1055



REF. = 0.24000+04	USER SUPPLIED REFERENCE VALUE
POSITIVE NORMAL - POSITION	DATA(59993 MILLS 07.344)
20-APR-1963 14:46:51.00	JOB NO. 7751
PROJECT : SICILY	SICILY 22 0001 Traumfilt.ROT 04.5 KR/SEC LINE

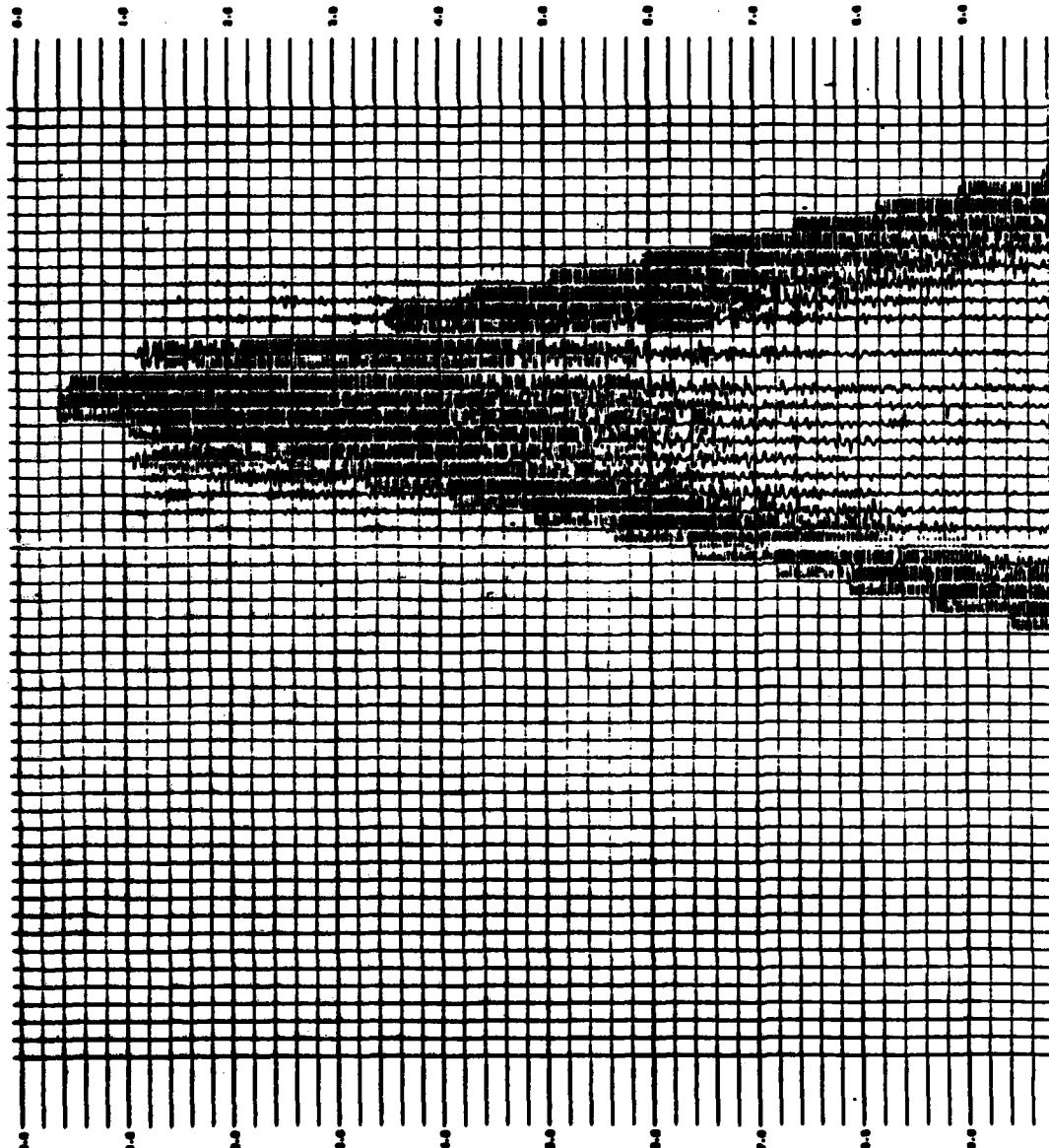
PROJECT : SICILY SICILY 22 08502 TRAUNFILT.RST 04.3 KI/SEC LINE 2
 20-APR-1968 10:56:31.72 JOB NO. 7600
 POLARITY NORMAL - POSITIVE DATA(59903 MILLS 07.344) PANEL NO. 1
 SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE REF. = 0.3030E+00



PROJECT : SICILY SICILY 22 08502 TRAUNFILT.RST 04.3 KI/SEC LINE 2
 20-APR-1968 10:56:31.72 JOB NO. 7600
 POLARITY NORMAL - POSITIVE DATA(59903 MILLS 07.344) PANEL NO. 1
 SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE REF. = 0.3030E+00

PROJECT : SICILY - SICILY 22 000+3 1/2 (UNIFLT.RST 04.0 KPS/SEC) LINE 2
20-APR-1963 10:59:06.36 JNS NO. 7609
POLARITY NORMAL - POSITIVE DATA(555553 MILLS SP.340) PNLN NO. 1
SECOND MURGE USING 4 UNINQ BINA ENTIRE TRACE REF. = 0.1847E+04

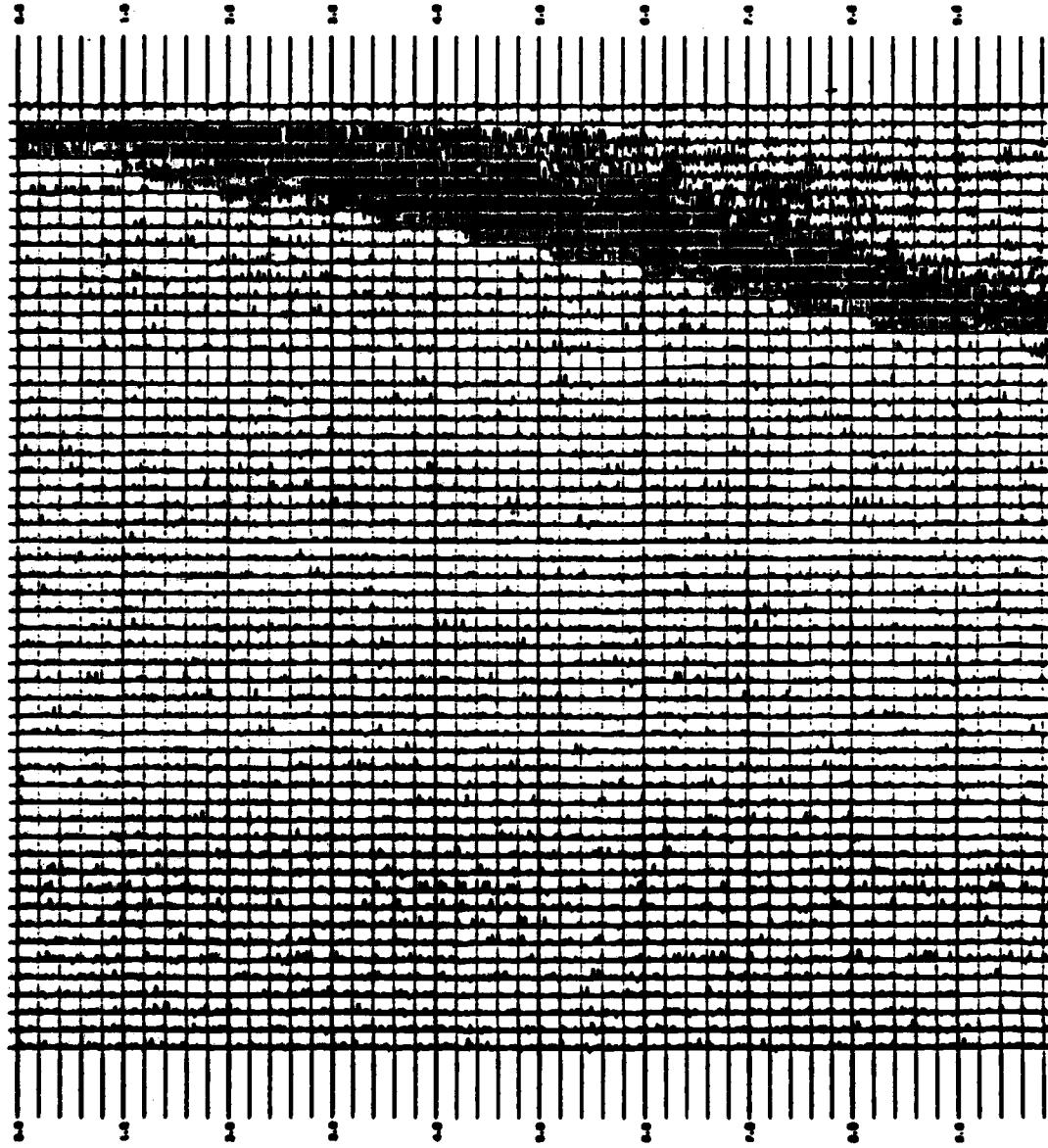
FF10



PROJECT : SICILY SICILY 22 00564 Trakunfilt.ROT 94.3 KHZ/SEC) LINE 2
20-APR-1962 11:01:25.50 JOB NO. 7020
POLARITY NORMAL - POSITIVE DATA(59993 MILLS SP. 3441) PANEL NO. 1
SECOND AVERAGE USING 4 WINDOWS OVER ENTIRE TRACE REF. - 0.1123E+04

PPID

4001
4002
4003
4004
4005
4006
4007
4008
4009
4010
4011
4012
4013
4014
4015
4016
4017
4018
4019
4020
4021
4022
4023
4024
4025
4026
4027
4028
4029
4030
4031
4032
4033
4034
4035
4036
4037
4038
4039
4040
4041
4042
4043
4044
4045
4046
4047
4048
4049
4050
4051
4052
4053
4054



00-00011-0 - 000 SOURCE SWING SWING SWING SWING SWING SWING
1 ON TURNS 0000-00 0000-00 0000-00 0000-00 0000-00 0000-00
0004 ON OFF 0000-00 0000-00 0000-00 0000-00 0000-00 0000-00
0 0000-00 0000-00 0000-00 0000-00 0000-00 0000-00

END

FILMED

1-84

DTIC